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Adult Cognitive Development Over the Lifespan: Conditions and Consequences of Higher Education Instructors' Beliefs

by

Alison McLaughlin

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Abstract

This exploratory, qualitative study uncovers the process by which teachers' beliefs about adult cognitive development over the lifespan are fashioned and by which higher education teaching practice is, concurrently, formed by teacher beliefs. Data from semi-structured interviews with eleven higher education instructors, each with experience teaching young, mature and older students were analyzed using the principles of grounded theory.

This study suggests respondents hold a belief in a malleable cognition rooted in a generally optimistic view of aging, discernment of a link between wilful endeavours and cognitive gains over the lifespan, and the distinction between short-term and lifespan cognitive changes. Conditions for this belief are teaching, challenging one's own cognition, engagement with others, witnessing the cognitive abilities of others over time, and refection on own cognition. Consequences of this belief were empowerment about one's own cognitive future and optimism about teaching efficacy and learners' potential across the lifespan.

Table of Contents

Chapter One: Introduction

Identification of the Problem 1
Purpose of the Study 4
Research Questions 4
Definition of Terms 5
Researcher Assumptions 7
Evolution of Study
Experiential Background 7
Conceptual Background 8
Application of Experiential and Conceptual Background to the Research Agenda 10
Relevance and Significance 13
Limitations 14

Chapter Two: Review of the Literature

Introduction 16
Adult Cognitive Development 17
Decrements in Adult Cognitive Development 20
Maintenance or Compensation in Adult Cognitive Development 31
Gains Associated with Adult Cognitive Development 35
Student Development 41
Perry's Theory of Intellectual and Ethical Development 42
Belenky, Clinchy, Goldberger, and Tarule's Women's Ways of Knowing 44
Baxter Magolda's Model of Epistemological Reflection 45
King and Kitchener's Reflective Judgement Model 46
Kohlberg's Theory of Moral Development 47
Gilligan's Theory of Women's Moral Development 48
Beliefs About Adult Cognitive Development 48
Summarizing Thoughts 53

Chapter Three: The Research Method

Approach 54
Methodological Framework 55
Research Strategy 59
Design 60
Development of Instruments 61
Sampling 67
Consent and Confidentiality 70
Data Collection 72
Data Analysis 74
Open Coding 75

Axial Coding 83
Selective Coding 85
Conditional Matrix 86
Trustworthiness of the Study 88

Chapter Four: Findings
Introduction 92
Descriptive Findings 92
Description of Participants 96
Basic Description of Factors Influencing Participants' Beliefs 96
Conceptual Findings 98
Stimulus 100
Clues 127
Reactions 142
Views 151

Chapter Five: Findings from Axial Coding
The Underlying Social Process 161
Stimulus 161
Clues 163
Reactions 164
Views 166

Chapter Six: Findings from Selective Coding
The Overarching Narrative 170
The Conditional Matrix 173
Responses to the Research Questions 177
Implications of the Research 179

References 182

Appendix A: Sample of Recruitment Letter to Program Heads 198

Appendix B: Sample of Letter to Program Heads Specifying Sampling Criteria 199

Appendix C: Sample of Recruitment Letter to Potential Respondents 200

Appendix D: Cover Letter for Written Survey 201

Appendix E: Consent Letter 202

Appendix F: Written Survey 203

Appendix G: Interview Guide 205

Appendix H: Initial Coding Structure Used for Open Coding, Breaking Down, Comparing, and Examining Phase 206

Appendix I: Open Coding, Conceptualization Phase 208

Appendix J: Reliability Check 209

Appendix K: Axial Coding, The Underlying Social Process 210

Appendix L: Selective Coding, The Overarching Narrative 213

Appendix M: Principle Theories from Literature Review Chapter and Their Connection to the Data 214

List of Tables

Table 1: Ranking of Factors that Have Influenced Respondents' Personal Beliefs About Adult Cognitive Development 97

Table 2: Concepts Emerging From Open Coding 99

List of Figures

Figure 1: Conditional Matrix 176

Chapter One: Introduction

Identification of the Problem

In her discussion of teaching practice in higher education, Sarah M. Dinham (1996) writes, "Our [teachers'] beliefs may be supportable as claims on knowledge, or they may not. It is important for teachers to recognize beliefs as beliefs, and to examine them as rigorously as we examine our disciplinary knowledge itself" (p. 304). This study is an exploration of teacher beliefs and the connection of the particular set of beliefs, instructors' conceptions of student cognition, to classroom practice. The relationship between teacher awareness of cognitive development and their resulting practice has been carefully explored in the elementary and secondary education contexts (Alvidrez & Weinstein, 1999, Dunn, 1997, and Collinson, 1996); however, there is a lack of studies addressing the question of how educators of adults understand and act on their conceptions of the cognitive development of their students in higher education.

The student body in higher education is changing - it is getting older. The presence of differently aged students is a characteristic of the current higher education teaching environment, and the disparity of student ages in our institutions is increasing (Weimer, 1996). Levine (1999) points out "less than a fifth of all undergraduates fit the traditional stereotype of the American college student – eighteen to twenty-two years of age, attending full time, and living on campus" (p. 45). During the ten year period of 1983 to 1993, the participation in higher education of students over thirty-five years of age increased by 83 percent (Carter & Wilson, 1995, p. 3 as cited in Rowley, Lujan & Dolence, 1997, p. 18). In American institutes of higher education,

undergraduates over twenty-five years of age constituted 39.3 percent of all students enrolled in the fall of 1998 (Gwaltney, 2000). Wright and Wallace (1997) assert, based on findings of the American Associations of Community Colleges, the number of students aged 35 and over are expected to outnumber traditional students in the near future (p. 15). Berman (1998) claims that college enrolment for students 65 and older rose 27% in the period between 1991 and 1995 (p. 106). In Canada, as elsewhere, the proportion of the total population that is mature or old has been increasing steadily since 1970 and is projected to continue to increase (Desjardins, 1993. p. 13). It is predicted, "that by the year 2031, one in four Canadians will be a 'senior learner' [over 60 years of age]" (MacKeracher, 1998, p. 259). The numbers of mature and older learners in higher education across North America are increasing and their presence will shape the conduct of learning in many ways. The presence of these learners challenges educators to examine what we believe about the potential and limits on human thought that come with age.

Apps (1979) analyzes the teaching/learning transaction and identifies "beliefs about the nature of the human beings and the adult as learner" as an underlying assumption in the teaching-learning relationship (as cited in Merriam & Caffarella, 1991, p. 289). The presence of greater numbers of mature and older students therefore invites educators to examine the underlying assumptions they hold about these learners. Assumptions about the cognitive development and potential of students across all points of the lifespan may be especially relevant to the teaching-learning relationship since instructional competence can be identified with an understanding of the cognitive development of one's students (Flavell, 1993).

Fang (1996) reviews the literature on teacher beliefs and practices, and although he concedes this is a small body of literature, he asserts that the complex relationship between teacher beliefs and practices is beginning to be better understood. Clark and Peterson emphasize that the two major domains in teaching are teachers' cognition and teachers' actions and observable effects (as cited by Fang, 1996, p. 48). Clark and Peterson also categorize the three fundamental types of teacher thought: first, teacher planning; second teachers' interactive thoughts and decisions; and third, teachers' theories and beliefs (as cited by Fang, 1996, p. 49). Most research in education centres on teachers' actions because they are observable and therefore amenable to measurement and empirical analysis. However, since the late 1980s, researchers have become increasingly interested in teachers' thinking. Teachers' beliefs as an area of study is concerned with what Harvey (1986) refers to as "a set of conceptual representations which signify to its holder a reality or given state of affairs of sufficient validity, truth or trustworthiness to warrant reliance upon it as a guide to personal thought and action" (p. 660 as cited by Fang, 1996, p. 50). Fang also notes that there are few studies that extend the research of teacher beliefs into the area of adult or higher education (p. 59).

Among the few studies of teacher beliefs in higher education are Orton (1996), Bishop-Clark & Lynch (1995) and Krause (1998). Orton (1996) examines how teacher beliefs about student learning can be justified and concludes that the view of knowledge for the teacher and the student may not always be in harmony. Bishop-Clark and Lynch (1995) scrutinize faculty attitudes toward mixed age college classrooms, in which the authors explore professor-student relationships and attitudes

toward younger and older students on a range of factors. This study defines young student as being traditionally aged, but offers no other definition for older students than to identify them as not traditionally aged. Krause (1998) explores the disciplinary culture of a higher education environment by identifying the core belief systems of faculty teaching adult undergraduate age-mixed classes. Like the Bishop-Clark and Lynch study, Krause identifies beliefs on a wide range of topics and issues, and defines adult students as being all those who are not traditionally aged. All three of these studies illuminate the importance of teacher beliefs within the educational environment of higher education, however, there is an apparent lack of studies that explore what instructors believe about cognitive development across the full range of student age groups now present in our institutions.

Purpose of the Study

The purpose of this study is to specify the influences that inform instructors' conceptions of adult cognitive development across the lifespan and to identify the potential impacts of these perceptions on their teaching.

The research is exploratory as opposed to theory testing or corroborative. The objective is to uncover the complex process by which teacher beliefs are fashioned and by which the action of teaching is, concurrently, formed by teacher beliefs.

Research Questions

The research question under investigation in this thesis is:

What is the relationship between teaching and higher education instructors' beliefs about adult cognitive development?

This main research question is addressed through an exploration of the following three sub questions:

Q1. What are the influences that inform educators' conceptions of adult cognitive development?

Q2. How are these influences related to teaching?

Q3. What is the impact of educator conceptions of adult cognitive development on teaching?

Definition of Terms

Qualitative research studies are open to the interpretations of those who participate in the study, so these definitions have emerged, in part, from the remarks of the representative respondents. The definitions are a precise description of how both the research participants and I used the following terms.

Adult Cognitive Development

Cognitive development refers to "the changes in thinking patterns that occur as one grows older" (Merriam & Caffarella, 1991, p. 210). It does not include changes in thinking that are due to mental illness or to changes in *what* the individual is thinking about. It does refer to changes in *how* people think over their lifespan, which include the possibility of cognitive losses, gains, or changes that are neither categorically a loss nor a gain (Dixon, 1999).

Instructor

The term is defined using Houle's definition of an "educator" as being "one who seeks to improve other individuals or society by increasing their skill, knowledge, or sensitiveness. The term implies that the educator [instructor]

exerts purposeful effort to achieve such objectives, though the people influenced may or may not intend to achieve them" (Houle, 1996, p. 256).

Teaching

Building on the definition above, the term "teaching" is defined in this thesis as the purposeful attempt to increase the skill, knowledge or sensitiveness of others.

Young Students

Young students are those who range in age from 18 to roughly 24 years of age. These are people who are traditionally aged undergraduates.

Mature Students

Mature students are those who range in age from roughly 24 years of age to 55 years of age. This definition is derived from the data of participants and describes a group of people who have not entered university immediately after high school and who fall into the broad category of people at midlife.

Older Students

Older students are those who are approximately 55 years of age or older with the upper limit being approximately 90 years of age. This definition encompasses those who could qualify for programs in higher education that are aimed specifically at senior learners but includes all students of this age regardless of their program affiliation.

Beliefs

Beliefs are the opinions, conceptions, and convictions consciously held by individuals, which guide their actions.

Educational Environment

The educational environment encompasses: the location where the action of teaching occurs; the institution associated with this location and all its amenities, policies, practices, and conventions; and all the people who are associated with these places.

Higher Education/ Post-secondary Education

These terms are used interchangeably and both identify the education of adults within colleges and universities where that education is not primarily for the purpose of developing the basic skills and knowledge taught in elementary and secondary schools and where the institution's purpose in presenting programming is not primarily to provide therapy, recreation or custodianship.

Researcher Assumptions

It is an underlying assumption of this research that nearly all people have formed some conception, however vague and uninformed, about how people's thinking is likely to change or remain stable as they age. It is further assumed that where these beliefs are conscious they can be identified and discussed. It is also assumed that cognition is a single construct. A final assumption is that the beliefs teachers of adults hold about the cognitive development of their students are important because teachers are an influential group who can stimulate or repress learning.

Evolution of Study

The evolution of this study is explained in relation to my experiential and conceptual orientations and the application of these orientations to the research agenda of this thesis.

Experiential Background

The genesis of the idea for this study began with my own teaching experiences and observations of mature students. I noticed that those students who were in their 30's and 40's and 50's seemed to have a much more critical engagement with material they were learning and recognized complexity in questions that their younger classmates seemed unable to see. It had been my assumption that adult thinking peaked in young adulthood around the age of 25, and after this point, the best an individual could hope for was to maintain the intellectual capabilities they had developed earlier in life. However, this is not what I was observing in my classes. The mature students, even those who had previously had little opportunity in their lives for intellectual stimulation, seemed to routinely outperform the younger students in situations that required depth of thought. An additional catalyst for this research was the contrast I experienced between the teaching expectations placed on me when I was a public school teacher and the expectations placed on me as an instructor in a post-secondary institution. As a teacher of those under 18 years of age, I was expected to understand all aspects of development that described my students. In contrast, as a post-secondary instructor of those who were over 18 years of age, the institutional teaching focus was almost entirely on understanding and communicating subject content while student development was disregarded. In agreement with Menges & Weimer, et. al, (1996), I believe that higher education teaching could be better for everyone if it were "student centered and learning oriented" (p. xvi). I began to realize that understanding how students think and examining my own assumptions about their

cognitive potential were important considerations for a reflective teacher working toward this goal.

Conceptual Background

The paradigm of inquiry in this research is constructivism. This guiding paradigm was identified by considering my worldview in relation to the four basic inquiry paradigms: positivism, postpositivism, critical theory, and constructivism; and then by considering the basic ontological, epistemological, and methodological considerations that Guba and Lincoln (1994) use to distinguish between these four basic paradigms. The paradigm guides the study "as to 'what is important, what is legitimate, what is reasonable' concerning systematic inquiry" (Sarntakos, 1993, p. 30 as cited by Annels, 1996, p. 380.) Constructivism most closely mirrors my worldview since constructivism, as identified by Guba and Lincoln (1994), holds that reality is a local and specific mental construction and that many such mental constructions exist (relativism). The relationship between the knower and what can be known is that "the knower is subjectively and interactively linked in relationship to what can be known". To find out what can be known the inquirer engages in "an inquiry process that creates knowledge through interpreted constructions dialectically transacted, thus aiming for more informed and sophisticated consensus constructs to provide a reconstructive understanding of a phenomenon" (Annels, 1996, p. 381). Thus, constructivism has resonance with my personal view that knowledge of processes, such as teaching, is best understood relative to the multiple perspectives held by the many individuals affected by that process.

A second conceptual basis for this study is my acceptance of the view that cognition is best described as being developmental. Theories and research associated with cognitive change can be considered within the conceptual framework of either cognitive aging or cognitive development. Cognitive aging is situated within the biomedical view with its "primary emphasis on isolating the source of impaired performance (the impact of biological aging) with age" (Hess & Blanchard-Fields, 1996, p. 10). Salthouse defines this view as primarily being concerned with understanding losses (1991). In contrast, cognitive development considers the multiple ways in which cognition changes over the lifespan by examining stability and gains in addition to losses (Sinnot, 1996)

Application of Experimental and Conceptual Background to the Research Agenda

In applying my experiential background to the research agenda, I wished to use a methodology that was appropriate to a research problem that seemed to be embedded in the process of teaching. The relationship between teachers' beliefs about adult cognitive development and teaching has two characteristics that Morse (1998) identifies as being amenable to exploration with grounded theory: it is process related and it is concerned with experience over time (p. 63). Grounded theory advocates starting a research inquiry with a problem that is conceptualized only as general disciplinary perspective (Corbin & Strauss, 1990). It is my intuition that most research problems in education could be traced back to such a beginning; in my case, it was interaction with students that sparked a general disciplinary perspective. This general perspective was refined into a consideration of the importance of teachers' beliefs concerning the cognitive development of their higher education students. As

Strauss & Corbin (1990, 1998) predict, the general perspective leads eventually to a question, such as in this research where a broad observation leads to the specific question, "What is the relationship between teaching and higher education instructors' perceptions of adult cognitive development?"

The application to the research agenda of my constructivist worldview was also a factor in my choice of methodology. In light of my constructivist view and the nature of the problem I wished to explore, I chose to use grounded theory. Since the study is exploratory and process oriented, it is appropriate choice to use the methodology of grounded theory. However, since a dichotomy exists within grounded theory, it is necessary to explain why this methodology is consistent with a constructivist research paradigm. The methodology of grounded theory is often placed in the modernist, post positivist paradigm of inquiry (Denzin & Lincoln, 1998); however, this categorization is more descriptive of the original traditions proposed by Glaser and Strauss (1967) and later reiterated by Glaser (1992). This original form of grounded theory is now sometimes referred to as the Glaserian stream of grounded theory, which holds that truth is present in the data and is objective. In contrast, the Strausserian stream of grounded theory can be placed within the constructivist paradigm (Annells, 1996, and Dey, 1999). In this branch of grounded theory, Strauss and Corbin (1990, 1998) associate data analysis with making interpretations of the data and basing these interpretations on multiple perspectives. Relativism is apparent when Strauss & Corbin (1990) state that a grounded theory is a manifestation of "a reality that cannot actually be known, but is always interpreted" (p. 22). Annells (1996) states "when relativist in ontology, subjectivist in epistemology, and when recognizing the

interactive nature of the inquirer/ inquired-into dyad . . . recently espoused grounded theory method obtains a dialectical quality. Thus a judgement can be made that grounded theory method can reside within the constructivist belief system" (p. 392). The methodology used in this study therefore employs the Strausserian stream of grounded theory since it has the greatest philosophical congruity with my personal worldview. Although the methodology used in this study is referred to as grounded theory, it should be noted that it is the Strausserian stream of grounded theory that is adhered to in this study. The methods chapter details the characteristics of grounded theory used to make this thesis "sensible, defensible and solid" (Morse, 1996).

My acceptance of developmentalism as the best descriptor for cognition has implications for the research agenda. By choosing the cognitive development perspective rather than the more restrictive cognitive aging perspective, this study is open to a wider range of results. The decrement orientation of the cognitive aging perspective implies a "uni-dimensional view that is primarily characterized by decline" (Hess & Blanchard-Fields, 1996, p. 13). In contrast to the cognitive aging perspective, cognitive development encompasses gains as well as losses and change is considered to be multidirectional and caused by multiple factors (Baltes, 1998). Cognitive development acknowledges the individuals' adjustment to the environment around them (Hess & Blanchard-Fields, 1996). By framing my research question in the context of cognitive development rather than cognitive aging, the study admits the full range of possibilities associated with cognitive change over the lifespan. Both quantitative and qualitative research can be used to explore cognitive development; as Sinnot (1996) states, "the developmental approach . . . complements psychometric and

information-processing approaches to intelligence and cognition by opening study to elements of emotion, life-stage tasks, and personal meaning" (p. 358). The legitimate inclusion of personal meaning as a source of research data within the cognitive development perspective supports my decision to use a qualitative strategy to illuminate beliefs about changes in how people think over the lifespan.

Relevance and Significance

Because this study uses qualitative data collection and analysis strategies, it has no statistical significance, so the relevance of the study is based on its juxtaposition of adult cognitive development and teachers' beliefs. There is an extensive body of literature that describes how adult thinking changes over the lifespan, and a limited body of literature that describes the interplay between teachers' beliefs and their teaching practice. However, there is very little literature that explores the didactic importance of lifespan cognitive development to teaching practice with differently aged post-secondary students. This gap in the literature includes a lack of studies addressing the extent of understanding instructors in higher education have about the effects of age on the cognition of their students. The assumptions that underlie teaching in higher education are in need of exploration, and this study sets out to provide some theoretical insights into the process by which teacher beliefs are created and disseminated within the context of the post-secondary educational environment.

This study may make a small contribution to teaching practice since the findings may be transferable to instructors in post-secondary settings who determine that the identification of the specific effects of teacher conceptions regarding adult cognitive development are plausible. This transferability may influence some instructors to

examine their own beliefs about adult cognitive development and to scrutinize how their own teaching practice has been shaped by their beliefs.

Limitations

There are several important limitations in this study. The first limitation is the relationship of the respondents' maturity to the quality of the data they provided. Respondents gave their perceptions of age-related phenomena, but there is no information in this study about how these age-related phenomena have exerted their influence on the respondents themselves. Since "aging is a characteristic of persons that cannot be experimentally manipulated" (Hertzog, 1995, p. 25), I have chosen to accept this limitation and treat all respondent expressions as equally valuable regardless of the age of the informant. This is why I report the teaching experience but not the ages of the respondents. The second limitation is that regardless of the respondents' ages, their thinking is not static. The data in this study is a "snapshot" of their opinions at a particular moment in time. Third, the sampling strategy of asking program heads to assist in identifying participants was highly effective in securing reflective and articulate volunteers, but these people, being aware that they were chosen by their program head, may also be more likely to make statements that would reflect well on the academic programs for seniors in spite of the guarantees for confidentiality. Fourth, as noted in another grounded theory study, having "accepted a particular theoretical and philosophical framework, other frameworks – other paradigms- which could be useful, might be excluded, thus limiting the analysis and interpretations of data" (Thompson, 1999, p. 80.). This research tries to capture some of the complexity of human interaction in the educational environment, but "the fact is

that teaching and learning are complex processes, most probably characterized by innumerable interactions and very few main effects" (Suter, 1998, p. 287). Due to the intricacy of this interaction, counter interpretations of the data may exist that are not addressed in this study. Fifth, the results are not generalizable since data collection and data analysis strategies were qualitative, and further, the transferability of the results are limited by the plausibility of the findings in relation to the reader's own life experience.

Chapter Two: Review of the Literature

Introduction

To observe the grounded theory use of literature described by Strauss & Corbin (1990) and Gall, Borg, and Gall (1996), the literature review was not completed in advance of data collection and data analysis. Instead, the review of literature was ongoing throughout the entire process of the research. Literature was used to stimulate theoretical sensitivity, to stimulate questions and conceptual development during the analysis process and to furnish supplementary validation of the findings that emerged from the process of analysis (Strauss & Corbin, 1990, p. 52). The discussion of literature "stands like parentheses" at either end of this research report; this chapter details the literature that informed the conduct of the study, and the findings chapters relate the products of open coding, axial coding, and selective coding to the literature in this chapter and to additional literature searched out as concepts emerged from the data analysis (Ely, Vinz, Downing, & Anzu, 1997, p. 225).

The two broad types of literature included in this chapter are studies of people in general, and studies of people (students and teachers) situated in an educational environment. Since people in education are a subset of the larger population, both types of literature are relevant to the research topic of teacher beliefs about adult cognitive development. In this chapter, first, the literatures drawn from studies of adult cognitive development over the lifespan are summarized, then the literature on student development concerned with cognitive-structural theories is explored and the limitations of these studies for describing students across the lifespan are briefly

critiqued. Finally, the literature concerning beliefs about cognitive development over the lifespan is reviewed.

Adult Cognitive Development

Adult cognitive development is defined in this thesis as "the changes in thinking patterns that occur as one grows older" (Merriam & Caffarella, 1991, p. 210). However as Flavell, Miller & Miller (1993) point out "cognition" is one of those "really interesting concepts of this world [that] have the nasty habit of avoiding our most determined attempts to pin them down . . . their meanings perversely remain multiple, ambiguous, imprecise, and above all unstable and open" (p.2). In adopting Merriam & Caffarella's simple definition, I do so while comprehending the inherent complexities that are invited in any discussion about cognition. I found it useful to follow the advice of Ashcraft (1998) by regarding cognition as "the collection of mental processes and activities used in perceiving, learning, remembering, thinking, and understanding, and the act of using these processes" (p. 5). This definition seems to me to capture most of what is usually meant when we refer to thinking and thought. The term development also has an underlying complexity beneath the simple idea of change over time. Sinnott (1998) identifies the context of studying change when she states, "developmentalists tend to study changes over time in the living organism as an adaptive system, one that coexists with other adaptive systems in a context" (p. 15). The study of adult cognitive development includes all that is implied by cognition (thinking) and change over time, but it is further complicated by the idea that changes in thinking are not mediated by time. Our thinking does not change simply because we are aging, as Salthouse observes:

> *Age* refers to an interval between two points in time. One point corresponds to birth of the individual, and the other to the time of some relevant measurement. Age is therefore not a direct causal factor, but merely a dimension along which many factors could be exerting their influence (1991, p. 20).

People's experience of aging, in regard to cognition or any other phenomenon, is a highly individual series of events. One of the few certain things about cognitive change is that we grow more individual as we age (Hess & Blanchard-Fields, 1996, p. 359). These events are not the someday occurrences of old age but a process we are all experiencing now. The increase of cognitive individuality as we mature is due to the fact that there are both between individual and within individual differences present. Dixon and Hertzog (1996) identify four ways in which cognitive variety can be manifested at a given point in time. First, individuals may vary from one another in regard to the cognitive strategies they use. Second, individuals may vary from one another in their level of "accomplishment or performance on a cognitive task". Third, individuals may vary within themselves (an earlier time period compared to a later time period) in the cognitive strategies they use. Fourth, an individual may vary over time (either earlier or later) in their "level of accomplishment or performance" (p. 25). Due to this high inter-individual and intra-individual variation, theories of cognitive development, when applied to adults, usually do not identify the specific age groups who will experience specific developmental traits.

There are five main theoretical issues in the study of adult cognitive development; these five issues were first outlined by Dixon and Hertzog (1996) and are paraphrased

here. The first issue is the universal versus the differential. A universal theory of cognitive development applies to all people under all circumstances and all conditions while, conversely, a truly differentiated theory of cognition describes a set of conditions that manifest themselves with great differences between individuals in timing, rate, and direction of change. The second theoretical issue concerns directionality, which is the idea that change can be a systematic progression over time, or conversely, change may be unsystematic and not necessarily unidirectional. Piagetian child cognitive development is a prominent example of a directional cognitive development theory since it has the characteristics of being progressive and goal directed (Dixon & Hertzog, 1996, p. 32). Linked to the issue of directionality is the concept of dimensionality, which raises the question of whether or not cognition is a single concept. The third theoretical issue in cognitive development studies involves plasticity and reversibility. Plasticity usually refers to cognitive change that indicates improvement in some way and is associated with intra-individual change (within the person). Reversibility is concerned with whether a cognitive process can be reversed and includes regressing to earlier stages in a progression (experiencing loss) or overcoming decrements to return to a more positive stage (experiencing compensation). The fourth theoretical issue is that of gains versus losses versus maintenance. Baltes (1998) suggests that there are three possibilities within the notion of cognitive change: improvement, decline, or no fundamental difference. Dixon & Hertzog, (1996) suggest that cognitive development may be "more completely and accurately characterized as a mixture or ratio of the three alternatives" (p. 37). The fifth and final, theoretical issue related to cognitive development is consistency, the

concern for whether a person's performance on tests of cognition remains constant; this issue arises as a reliability concern in quantitative research.

While any of the first four theoretical issues, could be used as an organizational structure for reviewing the literature on adult cognitive development within the realm of psychology, I have chosen to use Dixon and Herzog's fourth theoretical issue, gains versus losses versus maintenance as an organizer since it seems most suitable to discussing the range of changes that can occur in adult cognition over the lifespan. The mature and older students involved in higher education are a highly self–selective group of students who usually are motivated to participate in education because of an intrinsic love of learning, a quest for self-actualization, or professional and lifestyle enrichment (MacKeracher, 1998). These students are more likely to be described by models of gain or stability in cognitive function, but instructors, as actors in the wider world, may also draw their beliefs about cognitive development over the lifespan from models or observations related to decrements or stability in cognitive function. I now look at the decrements, maintenance and compensations, and gains that can describe adult cognitive development.

Decrements in Adult Cognitive Development

The decrements to cognitive development discussed here are those that are either universal in that they are likely to effect most people to some degree sooner or later at some point in their lifespan or those where decrements commonly are present but with a differential effect in the population. The universal concepts presented here are terminal drop, slowed processing, and cognitive processes associated with sensory

declines. The concepts that show differentiation are attention, memory and the findings of the Seattle Longitudinal Study.

Universal Decrements

The most profound and universal cognitive decline is the dramatic drop in intelligence, even among the most active people, preceding death. This effect is termed the terminal drop, and it is present, regardless of age, except in cases of sudden death. Schaie and Willis (1991) speculate about whether an observed drop in a person's cognitive functioning might predict death. They further speculate that individuals experiencing an undiagnosed terminal drop may skew the average test scores for people in their age group consequently leading researchers to believe that declines are general. Siegler's 1983 work established that the terminal drop is gradual for most people (as cited by Schaie & Willis, 1991, pp. 414-415). White and Cunningham (1988) found that vocabulary scores were the most likely to decline just before a person's death; they postulated that terminal drop may be limited to the verbal abilities that are usually least affected by age (as cited in Rybash, Roodin & Hoyer, 1995, p.143). In the specific case of terminal drop, it is clear that the complicating factor of separating health and cognitive declines comes into play. The body's systems decline and the mind's abilities show a corresponding decline.

The most consistent finding about decline in cognitive development is the slowed rate of information processing with advancing age (Rybash, et al., 1995, p.97). Hess and Blanchard-Fields (1996) give this evaluation of the apparent universal acceptance of slowed information processing:

> In fact, cognitive slowing is often depicted as the one fact about cognition and aging on which everyone agrees. Given that time is often a constraining factor in cognitive performance, both externally (e.g., the time available to make a decision is limited) and internally (e.g., one cognitive operation must be completed before another is begun), performance in many areas may suffer as we get older and declines in speed may limit performance . . . however, there is debate among researchers regarding the nature of age-related slowing. The major debate centers around the extent to which slowing represents a generalized phenomenon characterized by one or more factors or varies as a function of the performance domain (p. 12).

While the debate continues, it is still reasonable to accept that information processing slows with age.

The work of Salthouse (1991, 1996) has been of primary importance in establishing conclusions about processing speed. The information processing approach concentrates on between-stimulus variance (Schaie & Willis, 1986, p.238), and can be "reasonably and predominantly evaluated as a loss" (Dixon, 1999a, p.73). Park (1999) asserts that Salthouse has assembled a large body of evidence to support the theory that "nearly all age-related variance on almost any kind of cognitive task, ranging from memory to reasoning, can be explained by knowledge of the rate at which the individual makes speeded comparisons on perceptual speed tasks" (p. 51). Park points out that Salthouse has identified two mechanisms responsible for the relationship between speed of processing and cognition. The first is the limited time

mechanism and the second is the simultaneity mechanism. The former mechanism suggests that available time is often captured by early operations thus limiting the time that can be expended on later operations while the latter mechanism suggests that products of earlier processing can be lost by the time the later operations are completed. Park sums up her discussion of the mechanisms by observing that for older adults, performance will deteriorate on cognitive tasks so they may never reach the later stages of a complex task (1999, p.51). Salthouse (1991, 1996) asserts that perceptual speed measures are one effective index of slowed information processing because they are relatively simple, and yet operations such as comparison and substitution have some cognitive aspects. These measures have a high correlation with one another implying a common construct, and they are similar with respect to age-related influences (Salthouse, 1991, p.92). Rybash, Roodin and Hoyer (1995) point out that age-related perceptual slowing can be improved, but not eliminated, by extensive practice (p.96). Since Salthouse's underlying assumptions are accessible (Salthouse, 1991, pp.16 -19), and since there is wide acceptance of the slowed processing theory in the field (Hess & Blanchard-Fields, 1996, p.12), it is reasonable to accept that the slowed processing phenomenon of age-related cognition is true. In regard to slowed processing speed as it relates to the educational environment, Fry (1992) states, "For older adults much of the decline in learning or educational performance reflects a deficit due to speed instead of a decline in learning power" (p.318).

The last universal loss concerns cognitive processes associated with sensory decline. Wingfield (1999, 2000) points out that the incidence of "clinically significant

hearing loss" increases across a person's lifespan. By the age of 75, 40% of people have a hearing loss severe enough to affect speech comprehension, but the onset of this hearing loss may begin at a much younger age (p. 209). Older adults with hearing loss make more use of supporting context and less use of sound with the unfortunate result of reducing the resources available for higher-level cognitive operations. Consider this example: "The old man the boats." To make sense of it, you have to recognize that the word "man" is being used as a verb (Wingfield, 1999, p. 207). The recognition of the unusual use of the word "man" (i.e., "to operate") would be even more complex if the sentence were spoken rather than written. Then a hearing impaired person would have to rely on the higher-level cognitive skill of memory of the sentence while they were using cognitive energy to comprehend what had been said in the first place. In English, understanding the beginning stem of a sentence is often vital to understanding the entire concept of the sentence since the supporting context is of minimal use in such "left branching" sentences. In addition, older adults' difficulty with rapid speech is not just a result of age related hearing losses. Even older adults with no signs of hearing loss are "more vulnerable to time compressed speech compared to younger adults" (p.217). The reason for this difference is that information processing changes as we age. Here, we find corroboration for Salthouse's findings on slowed information processing.

Differentiated Decrements

The first differentiated decrement concerns attention. Rogers (2000) conducted a review of the current research on attention to answer the question, "Does attention decline with age?" (p. 69). The answer is that the levels of some types of attention

decline with age while others do not, and there is no uniform pattern to the degree of change in different kinds of attention. There are five varieties of attention: selective, divided, focussed, sustained, and automatic processing. Selective attention refers to attention in which we try to ignore irrelevant information in our environment while we concentrate on relevant information (Ashcraft, 1998, p. 68), whereas, divided attention is the ability to attend to two different pieces of information at the same time. In focussed attention, a person knows where the target or goal of a task will appear even though there is distracting information (Rogers, 2000, p. 60). For example, if you are looking for a number in a phone book while people around you are talking, you can focus on the task and shut out the distraction more efficiently because knowledge of the alphabet tells you where to locate the target. Sustained attention is the ability to concentrate over time, and automatic process concerns habits of mind that do not require conscious attention (Rogers, 2000, p. 65). There is an amazing similarity between types of attention shown in research to remain stable with age and the types of attention shown to decline with age. Roger's review of the literature indicated the types of attention that are maintained with age are selective, focused, divided, and the transition from attention demanding to automatic processes. The aspects of cognition that decline with age are selective, divided, and the transition from attention demanding to automatic processes. Rogers (2000) concludes that the overlap in the two lists demonstrates the complexity of understanding cognitive development, for some declines appear only in certain contexts (p. 69). Hasher and Zacks suggest the inhibitory mechanisms of older adults may be less efficient than younger adults, so inhibition of irrelevant ideas and environmental distracters may be the source of age-

related variation in attention (as cited in Rogers, 2000). The decline of inhibitory function with age is currently a subject of controversial debate; however, many researchers support the idea that some older adults perform most poorly when presented with a novel task that requires complex processing or when confronted with multiple tasks at the same time (Rybash et al., 1995, pp. 98 -101).

The second differentiated decrement, memory, is inclusive of a variety of "different memory systems, memory stages, or memory stores" (Craik, 2000, p. 75). Subsequently, there is a vast literature on memory, so I have chosen to focus on two influential studies, the Victoria Longitudinal Study and Park's work on short term versus long-term memory.

The Victoria Longitudinal Study (Hultsch, Hertzog, Dixon, & Small, 1998) was designed with a substantive focus on memory changes and predictors for memory change and involved 250 middle-aged and older adults tested 3 times over 6 years. This study concentrates on the memory systems most associated with aging: implicit memory, explicit memory, semantic memory, and episodic memory. Implicit memory is present without conscious awareness of possession of memory while, conversely, explicit memory involves the direct awareness of memory (Ashcraft, 1998, p. 26). Hultsch et al. (1998) summarize their data by noting there is little age difference for implicit tasks, but tasks that show more conceptual involvement (explicit) tend to be performed well by the young (p.29). Semantic memory "refers to our store of factual knowledge, usually disassociated from any episodic recollection of where and when that knowledge was learned" (Craik, 2000, p. 84). Hultsch et al. (1998) review the literature and find that that this type of memory remains relatively intact with aging (p.

33). Episodic memory is "memory for specific events located in space and time" and this type of memory is known to exhibit a marked decline with increasing age (Hultsch, et al, 1998, p. 34). An aspect of the Victoria Longitudinal Study of particular interest within the context of this thesis is that data from the study were used to test the hypothesis that remaining intellectually active can shield a person from cognitive decline in later life. Hultsch, Hertzog, Small, & Dixon (1999) found there was a relationship between intellectual involvement and later change in cognitive function. They note, however, that this result is also consistent with the idea that people who are cognitively high functioning have intellectually active lives (p. 263), which is why memory is a differentiated rather than a universal decline. However, Hertzog, Hultsch, and Dixon (1999) caution that there are many methodological problems associated with detecting the effects of engagement on cognition and that evidence of the engagement hypothesis needs further testing.

In agreement with the Victoria Longitudinal Study, Park (1998) finds that age decrements occur for most, but not all, types of memory; there are rarely decrements associated with implicit memory. Changes in short term memory, otherwise known as working memory, are thought to explain memory declines, and processing speed is also often identified as the source of memory deficits. Park (1999) investigates the mechanisms that account for changes in memory by considering the question, "How can both of them [processing speed and working memory] be explanatory mechanisms for age related declines in cognitive function?" (p.55). Park reaches three conclusions: first, age-related variance is indeed mediated by speed of processing and working memory; second, speed is a more fundamental mechanism than working memory and

would be related to all types of memory; and third, working memory has a stronger relationship to free recall (recall in which items can be recalled in any order) than to spatial recall (recall where items must be recalled in an order). Park's work demonstrates that both speed and working memory are important mechanisms in age related declines, but speed of processing mediates all significant age-related variance while working memory "has a direct path only to the two more effortful types of memory" (Park, 1999, p. 55-56). Like declines in attention, declines in memory are most apparent in connection with effortful and complex cognitive tasks, and these declines are conditional to the context of the task.

The remaining differentiated decrements concern the findings of the Seattle Longitudinal Study, which began in 1956 and continues to this day; the six major testing cycles were in 1956, 1963, 1970, 1977, 1984, and 1991. The study is rooted in a psychometric model, which emphasizes between-subject variability (Schaie & Willis, 1986, p.238). The Seattle Longitudinal Study has assessed mental abilities in more than 5,000 adults and has followed some for as long as 35 years. The scope of this study alone makes it worthy of attention.

The first important consideration is that Schaie (1990, 1994) has concluded that there is no uniform pattern of age-related changes in adulthood across all intellectual abilities. This reaffirms the notion that we become more individual as we age. Schaie notes that the researchers of the Seattle Longitudinal Study have come to believe that it is better to measure inferred constructs with multiple markers, so IQ does not serve alone to understand age changes (derived from longitudinal data) and age differences (derived from cross sectional data) in intellectual functioning.

In this extensive study, one question Schaie, Willis, and their research team sought to answer was, "At what age do reliably detectable age decrements in ability occur and what is the magnitude of that decrement?" (Schaie, 1994, p.305). This is Schaie's answer:

> The longitudinal data collected over the past 35 years indicate that average age decrements cannot be reliably confirmed prior to age 60, except for word fluency, which shows significant decline by age 53. However, reliable average age decrement is indeed found for all abilities by age 67. This decrement is modest until the 80s are reached, and for most individuals, it is not a linear phenomenon but occurs in a stair-step fashion (p. 308).

Using the longitudinal data at the latent construct level, Schaie found that compared to age 25, at age 88 "there is virtually no decline in verbal ability; however, inductive reasoning and verbal memory have declined by better than 0.5 SD, spatial orientation by almost 1SD, and numeric ability and perceptual speed have declined by more than 1.5 SD." Schaie confirms Salthouse's finding about slowed information processing when he cautions that much of the decline in late life can be attributed to the slowing of processing and response speed (p.308).

Schaie (1990) has also been able to arrive at some notable findings on the topic of the pattern and magnitude of generational (cohort) differences in intellectual ability. Schaie found links between generational age cohorts and psychometric abilities. Generational age cohorts describe those individuals born within a 7-year period in history. The single markers of primary mental abilities: verbal meaning, inductive

reasoning, and spatial orientation, showed increases for the later born cohorts. Number skill peaked for the 1924 cohort, and subsequently declined. Word fluency remains fairly steady across all cohort groups. For latent ability constructs, inductive reasoning and verbal memory show a positive upward gradient from 1907 to 1966. Spatial orientation showed a smaller positive gradient. Perceptual speed, numeric ability and verbal ability show a concave curve for the Depression cohort (Schaie, 1996, pp. 353 -354). The significance of this finding is that apparent age-related cognitive declines may be a function of the educational strategies and resources that a person had access to during the course of their life. Schaie (1995) states, "later born cohorts are generally advantaged when compared with earlier cohorts at the same age" (1995). This advantage is attributed to the greater educational opportunities accessible to the later born cohorts. Another significant aspect of the generational age cohort findings is that they suggest a very high proportion of cohort groups show maintenance of one or more intellectual abilities across the interval between testing cycles in the longitudinal analysis (Schaie, 1994, p.309). Dixon (1999) comments on this finding:

> Critics may quibble with Schaie's definition of maintenance and other issues, but the importance of his analysis in the present context [that positive views of cognitive change exist] is that it illustrates the implicit notion that loses occur in intellectual abilities, but they may not be as great, as uniform, or as universal as some observers would expect. This fact may be viewed, with some optimism, as a gain (p.83).

Overall, Schaie's findings from the Seattle Longitudinal Study reaffirm the individual variance present in cognitive aging experience, provide grounds for confidence in the efficacy of education, and allow an optimistic view of the potential of cognitive development over the lifespan.

Maintenance or Compensation in Adult Cognitive Development

Dixon (1999) provides a context for understanding the place of compensation in the cognitive development discussion by noting that despite the presence of well documented aging-related losses, it is also observable that these losses are not universally experienced and even individuals who suffer losses are able to perform extremely well under some conditions. Dixon says, "Compensation refers to processes through which a gap between current accessible skills and environmental demands is reduced or closed" (p. 85). There are several important theories that discuss the possibility of stable overall cognitive functioning in spite of localized cognitive declines. The interplay between fluid and crystallized intelligence, plasticity theories, and reversibility of loss through training all fall into the category of maintenance of cognitive function across the lifespan.

Fluid versus Crystallized Intelligence

The following basic definitions differentiate fluid and crystallized intelligence. Fry (1992) gives this description of fluid intelligence:

> Fluid intelligence consists of the ability to perceive complex relations and to engage in short term memory. Fluid intelligence also involves the ability for concept formation, reasoning, and abstraction. Underlying fluid intelligence is a neuropsychological base. Fluid

> intelligence is relatively formless and is independent of experience and education (p.309).

This definition is consistent with the previous discussion of decrements in short term (working memory), and identifies another possible cause for those decrements. Fry goes on to describe crystallized intelligence:

> Crystallized intelligence, by comparison, is affected by education and environment, and is largely a function of experience and knowledge of the intellectual and cultural heritage of society . . . crystallized intelligence is based on acculturation . . . Examples of abilities classified as crystallized include general information, vocabulary, practical reasoning, numerical reasoning, and the individual's ability to extract information from the social and physical environment (1992, p.309).

Some theorists hold that as abilities in fluid intelligence decline over time, abilities in crystallized intelligence compensate for these losses (Salthouse, 1991, 1996, 1999, 2000; Sternberg, 1996). Sternberg (1996) asserts that while fluid abilities are vulnerable to age-related declines, crystallized abilities are maintained and typically increased over a person's lifetime (p. 231). Christensen, Korten, Jorm, and Henderson (1997) suggest that education compensates for neurodegenerative changes by strengthening crystallized intelligence. Ideas about crystallized intelligence are closely related to the theory of practical intelligence because both are deeply concerned with the everyday problems of people's lives rather than the type of tasks that people encounter in academic tests. Crystallized or practical intelligence is also

important in everyday life for situations that require flexibility of thinking, and an awareness of the implications of context. The compensation of crystallized abilities for declining fluid abilities implies an optimistic future for people as they age.

Willis and Schaie (1986) define practical intelligence as "real-life tasks of daily living experienced by a specific age/cohort" (p.264). Similar to Sternberg (1996), they say "fluid abilities were found to account for more variance in perceived competence than were non-fluid abilities" (p.264). They agree with Sternberg to this stage, but they do not extend their argument to consider practical problem solving abilities to be even more powerful than crystallized abilities as Sternberg does. If we accept Sternberg's (1996) valuation of practical intelligence, we might consider it to be a cognitive gain; whereas, Willis and Schaie (1986) consider increased crystallized abilities as merely a compensation for decline in fluid abilities and not a net gain.

Salthouse's (1999, 2000) ideas about the interplay between process (fluid) and product (crystallized) types of cognition are corroboration for the notion that people are able to compensate for age related cognitive declines. Process (fluid ability) refers to "the efficiency or effectiveness of processing at the time of assessment" (Salthouse, 1999, p. 187); whereas, product (crystallized ability) refers to the accumulated products of processing carried out in the past, and consequently this type of cognition largely consists of various forms of acquired knowledge. Salthouse notes wisdom, judgment, practical intelligence, and social intelligence are not represented in his classification. Instead, Salthouse (1999, 2000) presents a classification scheme in which he considers process relations to age, product relations to age, and "process X product" (process and product interactions) relations to age.

In considering age-product relations, Salthouse (1999) notes there is an inconsistency across samples, so it is not possible to identify exactly *what* the relationship between age and product measures of cognition might be. He notes that one might expect product to increase across the lifespan and knowledge measures to increase, so why do the measurement instruments not indicate an increase in knowledge over the course of our lives? Salthouse (1999, 2000) has three possible answers for this question. First, increases might be offset by a decrease in efficiency of new learning (process), or by losses caused by simple forgetting. Second, an individual may have limited experiences during the course of their life and repeat the same learning opportunities. Third, individuals may become more focused and specialized in the type of knowledge they acquire with time, and this increase would not be detected on a general knowledge test. Salthouse (1999, 2000) notes that it is not viable at the present time to reach any conclusions about these possibilities. In my opinion, studies on expertise and wisdom may eventually reveal the relationship of specialized knowledge to overall cognition.

Salthouse's discussion of the process X product dimension of age relations is concerned with the joint effects of process and product. Either process and product could simply be additive, which suggests that there are independent influences created by the union of cognitive process and cognitive product, or process and product could be interactive with each other, which suggests that age relations that affect one cognitive aspect also depend on the level of the other cognitive aspect. Salthouse (1999, 2000) explores whether process can be used to predict the age-product relationship and vice versa. He finds that age-process relations are stable relative to

product, but age-product relations vary depending on the level of process cognition. When both process and product affect performance, Salthouse (2000) conceptualises the interplay between them by using the formula (p. 50):

Performance = a (Process) + b (Product)

Variation in the performance of an individual could be explained both by changes in the weightings of the predictors (notated as "a" and "b" in this equation) and by changes in the levels of the predictors (how much process or product relative to the other). Salthouse (2000) points out that this is interesting because you can view it as evidence for the existence of age-related compensation. Performance might remain constant even though the weightings and levels of the predictors might change. In other words, performance could remain the same despite cognitive declines in some components.

Plasticity

Plasticity theory also holds promise for the maintenance or improvement of cognitive abilities. Plasticity concerns an untapped reserve of cognitive ability within a person that can be utilized when needed. According to Baltes & Baltes (1990), "Studies repeatedly demonstrate that most old people, like most young people, possess sizable reserves that can be activated via learning" (p. 9). The term plasticity is closely associated with the extent to which access to these reserves can be activated by education. Like practical and crystallized intelligence, plasticity is inclusive of the idea that cognition can be improved by experience. Some theorists use the principles of plasticity to account for the poor performance of older adults on some types of tests. For example, Rybash, Roodin, and Hoyer (1995) say older adults have relatively little

success on measures of fluid intelligence because they have little recent experience tackling such problems. Performance levels on fluid intelligence tests improved when older individuals were exposed to education. Rybash, Roodin and Hoyer (1995) caution, however, that although the fluid abilities of older adults can be boosted through study and practice, they do not receive as much benefit from coaching of this kind as younger adults do. The trained older adults perform better than the *untrained* younger adults on measures of fluid intelligence, but the trained older adults do not perform as well as the *trained* younger adults (pp. 145-147).

Gains Associated with Adult Cognitive Development

The changing relationship of overall loses to overall gains over a lifespan of 90 years is that at first, overall gains are greater than overall loses, but sooner or later loses predominate. In general, when disease or mental illness is not present, losses (increase in undesirable attributes) begin to outnumber gains (increase in desirable attributes) at around 75 or 80 years of age. Therefore, there is potentially a long period, from birth to roughly 75 years of age when healthy, engaged individuals can expect gains to outnumber losses (Baltes & Baltes, 1990, pp. 17 – 18). At all stages, from birth through adulthood both directions of change, loss and gain, occur in each stage (Baltes, 1987 as cited in Dixon, 2000, p. 24). Dixon (2000) expresses how gains and losses can coexist when he says, "A simplistic illustration of how gains and losses may be intrinsically related in adulthood may be seen in the observation that as one 'gains' in years of age (i.e., becomes older), one 'loses' in time left to live (i.e., becomes closer to death)" (p. 24).

The potential for gains in adult cognitive development over the lifespan are discussed below in relation to the theory of postformal thought and the concept of wisdom as these ideas are conceptualized in the psychological literature.

Postformal Thought

Postformal operations is a developmental cognitive theory that has grown out of a neo-Piagetian tradition and advances the idea that there is continued growth in thinking and reasoning as we age. The central research focus of postformal operations studies is to establish the ramifications of a stage of thought that is higher than Piaget's formal operations (Sinnott, 1999). In Piaget's theory (1965) the most powerful and sophisticated stage, formal operations, emerges somewhere around early to mid-adolescence. Formal operations thinking is characterized by the ability to think about thinking; to use critical thinking skills; to consider motives in the past, present and future; and to be able to think about the abstract and the ideal. Postformal operations involve "the ability to order several systems of formal operations to the next step in the hierarchy of sophistication of thinking" (Sinnott, 1998, p.24). Sinnott (1996) identifies the general-operation rule, which describes the process post-formal thinkers use. Postformal thinkers first, choose a model from among many models and second, use their choice expeditiously as though it were true. Considering the relevance of many models is termed "necessary subjectivity", and action based on this consideration is termed, "ordering formal operations". Sinnott gives this example of the general-operation rule at work in postformal thinking:

> . . . you may be considering how to interpret some information you've read on adult cognitive abilities, so you open this book. In it you find

> several models, each of which is an internally consistent logical system and which has some merit (i.e., may be "true"). To actually interpret the information you have in hand, you have to choose a reality (a model) you want to adopt for now. When you select the reality (model) you want to impose, you can go on to talk about the interpretation of your data. But you *know* that no outside authority or logic could tell you which model is "true"; you had to select one, act as if it were true, and go on with your life. This can be postformal operations at work in your life (1996, p. 362).

Postformal thinking is related to formal thinking, but it is not just more of the same characteristics that describe formal thought. Kramer (1983) identified the three basic features of postformal learners. First, postformal thinkers possess an understanding of the relative, non-absolute nature of knowledge; second, postformal thinkers accept contradiction as a basic aspect of reality; and third, postformal thinkers are capable of dialectic reasoning. Postformal thinkers adopt a contextual approach to problem solving, and may be more directed towards problem finding rather than problem solving (as cited by Rybash et al., 1995, p.171-174). According to Sinnott's research, the most important advantage held by the postformal thinker is that they can see "the bigger picture" of life with all its complexity, ambiguity, and interconnectedness, and yet are able to make decisions and take action (1996, p. 368). As in other Piagetian thinking systems, a person who is capable of using postformal thought does not always use this type of thinking; although the person is capable of higher stage thinking, the other stages of thinking are still accessible to them (Sinnott, 1998, p. 25).

Postformal operations represent a gain since they are a new type of thought previously undeveloped in the individual.

Wisdom

There are many theories that attempt to define wisdom within the literature of adult psychology, and it is also recognized that laypersons hold their own ideas about wisdom. Sternberg asserts people have implicit theories about what it means to be wise, and they use these theories to evaluate others (as cited in Merriam & Caffarella, p. 1991). There is no consensus on how best to conceptualize wisdom, but wisdom, however defined, can be considered as a potential cognitive gain (Dixon 1999, 2000).

Wisdom can be associated with several conceptual frameworks. The first view is that wisdom is closely linked to growing experience with everyday problems and increases as we age because our practical intelligence is increasing. Practical intelligence is largely composed of the tacit knowledge that people use to function propitiously and to respond advantageously to changing circumstances. Common sense is the uncommon ability that Sternberg (1996) equates with practical intelligence, and further Sternberg (2000) suggests that wisdom is practical intelligence. Dixon (2000) identifies wisdom as varying from postformal operations since wisdom is consistently associated with common sense.

A second conception of wisdom is to link it with expert knowledge. Special knowledge, skills or talents usually characterize expertise, but Dreyfus & Dreyfus assert that experienced problem solvers also use reoccurring patterns and learned procedures (as cited by Smith & Tiberius, 1999). Bereiter and Scardamalia go beyond these ideas and assert that experts do more than rely on intuitive knowledge, learned

procedures and patterns, for experts engage in progressive problem solving that increases their expertise rather than just learning to solve problems based on previous knowledge (as cited by Smith & Tiberius, 1999). Expertise, when defined as a growing body of specialized knowledge acquired through prolonged experience over time, can be identified with wisdom, (Dixon, 2000, p. 32). Experience is the common element that allows the distinctive concepts, practical intelligence and expertise, to be linked to wisdom. Other theorists see practical intelligence as synonymous with expertise in some contexts; for example, Tennant and Pogson (1995) say, "Practical intelligence, when applied in the context of a particular domain of work or knowledge, is often referred to as expertise".

Other theoretical perspectives of wisdom include: Robinson's observation that our conception of wisdom has changed over time; Birren and Fisher's acknowledgement that many cultures attribute wisdom to older persons who reoriented their lives from action to reflection, and Meacham's proposal that wisdom is an awareness of the fallibility of knowledge (as cited Merriam & Caffarella, 1991, p. 198). Staudinger (1999) relates mature thought with context dependent "life insight", which is operationalized as wisdom-related knowledge and judgement (p. 348).

The literature discussed in relation to the psychological perspective of adult cognitive development and the cognitive structural theories of the student development perspective illustrate the enormous array of explanations for how adult thinking changes over the lifespan. The numerous points of overlap between the theories show how the research strands are interconnected with one another. The purpose of this section of literature review was to increase my theoretical sensitivity to

the concept of adult cognitive development and to inform the questions I would ask in the conduct of the research. The key idea that I hope the reader will derive is that adulthood, *all of it*, both inside and outside the educational environment, is a time of dynamic events in cognition.

Student Development

Rodgers defines student development as "the ways that a student grows, progresses, or increases his or her developmental capabilities as a result of enrolment in higher education" (as cited in Evans, Forney, &Guido-DiBrito, 1998, p. 4). The student development field of study is concerned with the cognitive, affective and behavioural domains of students in higher education, but since the focus in this thesis is on cognitive development, I concentrate on theories related to the cognitive domain. Evans, Forney, and Guido-DiBrito's (1998) provide a framework that identifies which of the numerous student development theories can reasonably be associated with cognitive development. The theories Evans et al. (1998) recognise as cognitive-structural theories are Perry's Theory of Intellectual and Ethical Development; Belenky, Clinchy, Goldberger, and Tarule's *Women's Ways of Knowing*; Baxter Magolda's Epistemological Reflection Model; King and Kitchen's Reflective Judgement Model; Kohlberg's Theory of Moral Development; and Gilligan's Theory of Women's Moral Development. Cognitive – structural theories are defined by Evans et al. as theories, which "focus on *how* people think, reason and make meaning of their experiences" (p. 124). The difference between cognitive development theories within student development and the broader concept of adult cognitive development is that the former is concerned with the effects of participation in higher education on

thinking. Corroboration for the notion that education has an effect on cognitive growth can be found in Gribbin's work, which found education to be an antecedent for high levels of cognitive functioning in later life (as cited by Schaie, 1994, p. 310). The following cognitive-structural theories of student development enrich our understanding of what can be meant by the term, "adult cognitive development". All of these theories focus on the potential of overall gains.

Perry's Theory of Intellectual and Ethical Development

Perry's theory presents a scheme that outlines the principal happenings that mark a person's intellectual and ethical development from adolescence to adulthood. The theory, first published in 1968, sought to sketch human experience within a pluralistic culture (Perry, 1968/1999, p. xliv). Perry's scheme of development is made up of nine positions, each with no fixed duration in a person's life and each simply representing the dominant structure descriptive of a given person at a given time (Perry, 1968/1999). As described by Knefelkamp in the reissue of Perry's original text, these are the nine positions:

1.Strict Duality
2. Multiplicity Prelegitimate
3. Early Multiplicity
4a. Multiplicity Coordinate

} Elaborations on Dualism

4b. Relativism Subordinate
5. Contextual Relativism (Relational Knowing)

6. Anticipation of Commitment
7. Initial Commitment
8. Multiple Commitments

} Anticipation, Experience of Commitment

9. Resolve

As Evans et al. point out the key words: duality, multiplicity, relativism, and commitment as used by Perry, highlight the transitions from one position to another within the scheme (1998, p. 131). Dualism sets up meaning dyads in which there is choice between two things, good versus bad, right versus wrong, and so on. Knowledge is regarded as quantitative facts and authorities are seen as being the arbiters of right answers. Multiplicity is the honouring of diverse views and opinions; knowledge is now seen as linked to one's ability to think analytically. Relativism in Perry's words "means relative to what – to something – it implies comparison, criteria, and judgement!" (Perry, 1968/1999, p. xix). Commitment concerns judgements and affirmations that are made from the perspective of relativism. Knowledge now is viewed more qualitatively and is dependent on context (Evans et al., 1998, p. 32). Further, it should be noted that in Perry's theory, cognitive development is not linear, for there are periods of linear development or plateau and periods where a person might revert to dualism (Perry, 1968/1999).

The Harvard and Radcliffe students of the late 1950s, who formed the sample of the original work, have been a source of criticism for Perry's theory since the results obtained from this elite group of white students could not be generalized to the broader population of higher education students. In the context of lifelong development, it should be noted that Perry worked with traditionally aged higher

education students (Perry, 1968/1999 and Evans et al, 1998), and therefore this theory may be of limited use in describing students at all points in the lifespan.

Belenky, Clinchy, Goldberger, and Tarule's Women's Ways of Knowing

Belenky et al. identify five perspectives from which women know the world: silence, received knowledge, subjective knowledge, procedural knowledge, and constructed knowledge (1986). They qualify the directionality of their stages by saying that these categories are not fixed, exhaustive or universal, and that similar categories may be found in men's thinking. Orr and Luszez (1994) conducted a study examining commonalities between women's ways of knowing (with its highest stage of constructed knowing) and postformal thought (relativistic thought). They found increased education was indicative of relativistic thought but not constructed knowing. Neither the men nor the women in this study (n = 60) relied on received knowing, women used subjective knowing more than did men, while men used procedural knowing more than women. There were no gender differences in relativistic thought or constructed knowing. The Orr and Luszez study is illustrative of the considerable overlap that seems to exist between theories of adult cognitive development and is included here to illustrate this overlap rather than to refute the work of Belenky et al. The Orr and Luszez findings are also relevant in the context of this study since they found that age (in a sample aged 27 to 43 years) predicted neither ways of knowing nor relativistic thought. This indicates that the researchers have considered the mature segment of the population if not the older segment of the population, so this theory has some value for describing cognition over the lifespan.

Baxter Magolda's Model of Epistemological Reflection

Perry and Piaget are major influences in Baxter Magolda's work, but her model differs in its underlying use of naturalistic inquiry and its identification of gender-related differences (Evans et al., 1998). Baxter Magolda's theory "identifies epistemic assumptions, or assumptions about the nature, limits, and certainty of knowledge, that form the structure of each way of knowing" (Baxter Magolda, 1998, p. 351). Ways of knowing are conceptualised as "patterns", a term Baxter Magolda borrows from Marilyn Frye in order to "make sense of experience but stop short of characterizing it in static and generalizable ways" (Baxter Magolda, 1992, p. 17 as cited in Evans et al., 1998, p. 154). The Epistemological Reflection Model is comprised of four stages: absolute knowing, transitional knowing, independent knowing, and contextual knowing and each stage has patterns or ways of knowing associated with it. Baxter Magolda discerned gender-related patterns in the first three of these stages. Without itemizing the socially constructed characteristics of each stage and its associated patterns, it is still possible to appreciate the key point that the gender-related pattern differences Baxter Magolda proposes are preferences, "differences in style, namely relational and separate, rather than differences in structure"; these "offer insights into learner expectations that stem from their beliefs, preferences, and activities" (Baxter Magolda, 1998, p. 351).

King and Kitchener's Reflective Judgement Model

Kitchener and King found that age and education effect people's ability to make epistemic assumptions; they asserted that it is primarily educational experiences, not age, that influences people about what constitutes valid knowledge. People in their late 50s may hold similar epistemic assumptions as traditionally aged students, and therefore education is a major influence on how people learn to view knowledge (Kitchener & King, 1990). Kitchener and King suggest that there is a developmental sequence that progresses from simplistic reasoning to more complex reasoning (reflective judgements) and that this sequence both limits learning and can be influenced by learning (Kitchener, 1986 and Kitchener & King, 1994). King and Kitchener propose a connection between reflective judgement and critical thinking that illuminates how people learn to justify their beliefs through defensible arguments (King & Kitchener, 1990, 1994). There are seven stages in the Reflective Judgement Model with each stage being characterized by a set of assumptions about knowledge, the process of acquiring knowledge, and strategies for solving ill-structured problems (King & Kitchener, 1994). The seven stages can be grouped into the categories of prereflective thinking (Stages 1, 2, and 3), quasi-reflective thinking (Stages 4 and 5), and reflective thinking (Stages 6 and 7). The prereflective thinker assumes knowledge to exist absolutely, even when an answer to a problem is not immediately available. A quasi-reflective thinker recognizes that knowledge is uncertain and idiosyncratic to individual contexts though the knower is inclined to select evidence that supports their beliefs. A reflective thinker perceives that knowledge is constructed and that "beliefs are justified probabilistically on the basis of a variety of interpretive considerations"

(Kitchener and King, 1994, p. 16). The usefulness of the Reflective Judgement Model in the context of this thesis is that it aims for applicability to populations of all ages, from late childhood through adulthood (Evans et al., 1998, p. 161), and so this model is a useful descriptor of adult cognitive development across the lifespan.

Kohlberg's Theory of Moral Development

Kohlberg's Theory of Moral Development generally supports Piaget's cognitive development stage theory in which children learn from experience as they progress from a highly egocentric perception of the world to perception that includes the abilities to generalize, categorize, and discriminate (Atkinson, 1983). In Kohlberg's theory there is a progression through a six stage sequence grouped into three levels that extends from a simple, egocentric, unstable stage to a period of mutual cooperation, and finally, to a stage in which social consensus and rationality are comprehended and respected. A precise description of all these levels is not useful in the context of this study since the first two levels are descriptive of children and adolescents. The final level, postconventional development, includes stage 5 and stage 6. In stage 5 (social contract) actions are based on upholding individual rights and democratic principles, and in stage 6 (universal ethical) actions are based on respect for human dignity (Evans et al., 1998). Kohlberg saw moral judgement as "primarily a function of rational operations. Affectional factors . . . enter in, but moral situations are defined . . . by the judging individual" (Kohlberg, 1972/1973, p. 13). More recent research has identified exposure to higher-stage thinking and disequilibrium (cognitive conflict) as the two factors that appear to contribute to moral development (Walker, 1988 as cited by Evans et al., 1998). Kohlberg's model of

moral development is clearly linked to *how* people think. However, in the context of this study, a review of the literature revealed no studies linking Kohlberg's moral reasoning stages to age groups beyond those of traditionally aged students in higher education.

Gilligan's Theory of Women's Moral Development

In Gilligan's theory, care and responsibility are the two guiding factors that direct women's morality. Her framework of moral development has a sequence of three levels and two transition periods in which there is an increasingly intricate relationship with other people and an increased comprehension of the interplay between selfishness and responsibility (Gilligan, 1995). Evans et al. (1998) sum up the importance of Gilligan's influence on cognitive development theory by pointing out that much of the recent literature on student cognitive development has called into question the reliance on rules and objectivity typical of traditional models and has instead embraced an emphasis on care and connection.

Beliefs about Adult Cognitive Development

It is readily observable among people of our own acquaintance that cognitive changes vary in nature and rate between individuals. We can observe, from our own life experience, that declines in the way people manage information can begin as early as young adulthood for some people while others are engaged, articulate and thoughtful into advanced old age (Hess & Blanchard-Fields, 1996, p. 3-4). The literature in this section is included to illustrate what is known about the beliefs people hold about cognitive capabilities at different points in the lifespan.

There are several studies that suggest that laypersons have fairly positive conceptions of adult cognitive development over the lifespan. Heckhausen, Dixon, and Baltes (1989) examined the belief systems about adult development held by young, middle-aged and old adults. Their procedure was to present each group with a list of 358 adjectives that described characteristics of people. The participants rated each adjective for "perceived sensitivity to developmental change" depending on whether they thought this characteristic did not increase, became stronger, or became more common through adulthood, (defined as 20 to 90 years of age) (p. 110). Next, the subjects were asked to rate whether each adjective indicated a desirable, undesirable or neutral trait. Dixon (2000) re-examined this study and selected the attributes that were arguably cognitive. Dixon found that the original participants in the Heckhausen et al. (1989) study:

> . . . rated as virtually unqualified cognitive gains with aging the following attributes: human knowledge, open-minded, smart, experienced, well-read, reasonable, level-headed, wise, and educated. Cognitive attributes that fit the characteristics of gains-to-losses [positive characteristics attained with age but ultimately declining] were: logical, productive, methodical, ready-witted, adaptive, industrious, and planful. In contrast, cognitive attributes that were believed by participants to be losses with aging were: moralistic, overcautious, complicated, obstinate, forgetful, headstrong, stubborn, and absentminded (p. 28).

Overall, Dixon found that the participants in the Heckhausen et al. study held beliefs that produced a gains to losses ratio very similar to that noted by Baltes. Baltes & Baltes (1990) identify an overall gains in adult cognitive development to overall losses in adult cognitive development ratio in which gains outnumber losses for most of the life-course, but with inevitable declines outnumbering gains after the age of 80 (p. 18). All these findings show a generally optimistic view of adult development. Additionally, Heckhausen et al. (1989) found that young, middle-aged, and older persons held common beliefs about development through adulthood. They attribute these common belief sets to "the shared impact of socialization and age stratification in a given society" (p. 119).

Hummert (1990) found that young people do not associate negative stereotypes with the old in general, but only with the very old. In addition, according to Hummert's findings, young adults see the positive stereotypes as more typical of young adults than of the negative stereotypes. Hummert (1990) asserts, "the research on multiple stereotypes of the elderly has been successful in debunking the myth of widespread negative stereotypes of older adults" (p. 193). However, Hummert cautions that some elderly people are negatively evaluated and negative stereotypes increase with the age of the target group. Hummert's study indicates that people seem to be aware that the most severe declines are associated primarily with very old age and that the variability of developmental experiences in old age do not encourage a belief in stereotypes for other points in the lifespan.

In contrast to the optimistic view of adult cognitive development, Kite and Johnson (1988) found in a meta-analysis of the literature that attitudes toward the elderly are

more negative than attitudes towards the young. Kite and Johnson state, "older people were judged more negatively than younger people across all rating dimensions, although the most extreme dimensions were competence and physical attractiveness" (p. 240).

Beliefs people hold about their own cognitive future are also important. Heckhausen & Krueger (1993) compared the developmental expectations we hold for other people with the expectations we hold for ourselves. In this study, the authors maintained, "normative conceptions about development are widely shared among members of a society" and they wished to test whether these normative conceptions were applied to the self (p. 539). They found that normative conceptions were social reference points for three kinds of social comparisons: self-assessment, self-enhancement, and self-improvement. All these modes of social comparison could be associated with young, middle-aged and older participants but to varying degrees. Youth was a time of self-assessment; self-enhancement characterized the middle-aged and elderly; and all age groups could identify self-improvement goals, especially for others. People of different age groups did hold the same expectations for themselves over most of their lives as they did for most other people, although people had more optimistic expectations for their own old age than for the old age of other people.

Hertzog, Lineweaver, and McGuire (1999) also assert that implicit theories about the nature of age-related changes are an important part of how people regard their memory. They base their argument on Dweck's implicit theory of cognition in which people believe that cognitive ability is fixed and innate as opposed to being determined by effort and practice (as cited by Hertzog et al., 1999, p. 45). The

implicit theory pertains to some older people, who perceive declines in cognition to be inevitable and beyond their control. In contrast, other elderly people, who view ability as determined by their own effort, may be more likely to behave effectively in situations requiring memory or cognitive skills. Hertzog et al. assert, "studies examining stereotypes about aging and memory have indicated that a belief in memory decline is relatively pervasive" (p. 45). There are two possible sources for negative cognitive stereotypes: the internal perceptions of the old themselves and the external perceptions of those in society. Negative stereotypes of aging may be held by the older person themselves since people may tend to overestimate the significance of memory loss experienced by the normal elderly (Rybash, Roodin & Hoyer, 1995, p.124), and these negative self-conceptions of aging and memory loss can sabotage a person's own learning potential (Fry, 1992, p. 318). The negative stereotypes about cognitive aging can also emanate from society. Levy and Langer found that negative stereotypes about the elderly were prominent in American culture. These two researchers found a link between cultural stereotypes and the extent to which aging is associated with a decline in memory performance since societal beliefs can create a self-fulfilling prophecy of diminishing memory for the individual who believes the stereotype (as cited in Hess & Blanchard-Fields, 1996, p 7).

In regard to beliefs about the cognitive development of people at midlife, Willis and Schaie (1999) point out that Western culture holds two opposing popular beliefs of people at midlife (those between the ages of 40 and 60). One concept is that middle age is the "prime of life" and the other concept is that middle-aged people are "over the hill". Willis and Schaie pull together data from the Seattle Longitudinal Study to

evaluate whether either of these perceptions is true. They find that the period roughly between the ages of 40 and 60 is " a period of maximum performance on some of the more complex, higher order mental abilities, such as inductive reasoning, spatial orientation, and vocabulary" (Willis & Schaie, 1999, p. 237). Men reach this peak in their 50's while women experience peak performance in their early 60's. However, women experience decline in perceptual speed somewhat earlier than men. Willis and Schaie point out, based on Schaie (1996) that "contrary to stereotypical views of intelligence and the naïve theories of many educated laypersons, young adulthood is not the developmental peak of cognitive functioning for many of the higher order cognitive abilities" (1999, p. 238).

Summarizing Thoughts

Beliefs about aging and age stereotypes have a far-reaching influence on how we behave toward one another and the respect that we hold for people. These beliefs seem to me to be of even greater importance when they are held by an influential group of people such as teachers. The multiple theories about adult cognitive development, the points of overlap between these theories, and the research on beliefs about cognitive development assisted my theoretical sensitivity to the data I collected and helped me to make a thorough analysis of the data.

Chapter Three: The Research Method

There is a lack of studies that examine higher education instructors' awareness of adult cognitive development and the impact of their beliefs on the educational environment in which they participate, so I have chosen to use the methodology of grounded theory because it is useful in an exploratory study in that it allows the possibility for new theory to emerge from the data (Strauss & Corbin, 1990, 1998).

This chapter details how grounded theory has influenced the conduct of this study through a description of the approach, the design, the sample, the consent and confidentiality, the data collection, the data analysis, and the trustworthiness of the data.

Approach

Grounded theory is a methodology complicated by debate between the originators of the methodology, Glaser and Strauss, on several theoretical and procedural points. It is therefore necessary for a researcher using this methodology to follow the advice of Babchuck (1997) and identify precisely the elements of grounded theory that have been employed. As explained in chapter one, this thesis follows the inquiry paradigm of the Strausserian stream of grounded theory. To contextualize the methodological framework upon which this study is based, I include a very brief description of the original grounded theory methodology developed by Glaser and Strauss (1967) and identify the elements within this original methodology and within the Strausserian stream of grounded theory that have been used in this study. Next, I describe the research strategy of this thesis.

Methodological Framework

Grounded theory was developed as a reaction to the predominant methodologies of the 1950s in sociology that relied on formulating a hypothesis that represented the researchers assumptions of the research environment before beginning work in the field. The hypothesis was deduced from a study of literature and past studies and was not altered by any experience the researcher might subsequently have while actually working in the field. At the end of the research, the hypothesis would be assessed on the basis of empirical information and either rejected or not rejected. The researcher operating with this approach "becomes blind to everything not taken into account in his/her hypotheses before commencing research. What is not anticipated in the beginning is not noticed in the course of the research" (Altrichter & Posch, 1989, p. 21). Grounded theory's "inventors" Anslem Strauss and Barry Glaser began developing a new research methodology in 1964 as a polemic of the deduced hypothesis or the procedure of the "hypothetico deductive". Strauss and Glaser believed the "hypothetico-deductive" approach did nothing more than verify existing theory and consequently, it did nothing to advance the generation of new theory. Their grounded theory methodology stressed the need to build theory as one advances through the research and to "ground" that theory in the data of the inquiry.

Glaser and Strauss set out to build a methodology that connected theory more closely to data gathered in the field by constantly collecting and analysing data as one progressed through the research. Their aims were to create a logical and rigorous framework for doing this work and to provide convincing justifications for using a qualitative approach (Dey, 1999, p. 12).

Confusion followed the early widespread use of grounded theory when Glaser and Strauss began to disagree on both the underlying paradigm and appropriate procedures for grounded theory's implementation. In particular, Glaser attacked Strauss's later work and went so far as to claim that Strauss had never understood the methodology's reliance on emergence of ideas completely free from a systematized method of analysis (Glaser, 1992). The resulting uncertainty has led to a haphazard use of the methods of grounded theory (Babchuck, 1997). However, there are basic procedural features of grounded theory that have withstood the subsequent turmoil that developed around this methodology (Rennie, 1998, pp. 101-104):

1. Grounded theory is designed to promote the systematic study and representation of the meaning of data.
2. The goal of grounded theory is to develop a theory that is accountable to the data under study.
3. Data collection and data analysis proceed concurrently.
4. Reduction of the data is achieved by conceptualizing the attributes that sets of data appear to have in common (constant comparison).
5. Data collection and data analysis continue until it is judged that the new data add no further meaning and hence no further categorization to the taxonomy (theoretical saturation).
6. The researcher has the option of addressing generalizability by sampling from alternate sources of data as the research progresses (theoretical sampling).

7. Writing notes about all data collection and data analysis decisions is crucial (memoing).

These are the seven basic procedural principles upon which the methodology of this study is based and which have been adhered to in this research.

The basic assumptions underlying grounded theory are closely aligned to the distinction that this methodology makes between the subjective internal reality of people being studied and an objective reality, "which is viewed as external to the consciousness of individuals" (Conrad, 1982, p. 239). This is a second aspect of the polemic stance from which grounded theory originated. The epistemology of "logical positivism" was the norm in the social sciences during the period of the 1960s. Strauss and Glaser's disagreed with the stance of logical positivism with its belief that truth was independent of the researcher. Strauss and Glaser saw the researcher as a part of the research field since the researcher's experience of the setting informed and enhanced their decisions. This part of the polemic of grounded theory has been the subject of criticism since, as noted above, one of the fundamental procedural principles of grounded theory is that the theory springs directly, and presumably only, from the data uncovered in the field. The inclusion of researcher experience as an underlying assumption of the methodology is in seeming contradiction to the inductive process of the method, which suggests that theory must be derived solely from the data. Altrichter and Posch (1989) points out that grounded theorists "solve this conflict by a conceptual trick: they distinguish 'perspective' from 'theory' " (p. 24). Strauss defines perspective as those ideas with which a researcher enters the field and theory as those formulations based on findings and descriptive of the truth of the

phenomenon under study. (Strauss & Corbin, 1990, p. 20 –25). In this way, theory is induced from data, but perspective can be deduced from researcher experience that I interpret to include ideas derived from literature reviews and experience. Eventually, Strauss moved to a constructivist perspective of research which differed from the postpositivist view held by Glaser (Annells, 1996, Dey, 1999).

Strauss and Corbin's view that the truth about a phenomenon lies primarily in the multiple perspectives of participants in the research setting and the researcher's interaction with data as theory begins to emerge is linked to the following five characteristics of grounded theory methodology (Strauss & Corbin, 1990, 1998):

1. An *exhaustive* literature review is *not done* in advance so as to allow theory to emerge directly from the data and remain "grounded" in the data.
2. Literature is reviewed continuously throughout the data collection and analysis.
3. The sample includes people who are experiencing the social process being investigated.
4. When describing findings, descriptive language *must* be used to provide the reader with the steps in the process and the logic of the method.
5. Data are compared continuously with other data to detect emerging categories and themes and to direct the data collection process.

These lists of fundamental procedural features and characteristics are, of course, a simplified outline of a complex set of research practices, but they highlight the procedural points of grounded theory that have been undertaken in this study. The

application of these procedures will be described in more detail in the design, sample, data collection, and data analysis portions of this chapter.

Research Strategy

Grounded theory can use either or both quantitative and qualitative sources of data to address a research question. I am interested in understanding the participants' perspectives in the participants' own terms, and I therefore choose a qualitative approach (Morse, 1998). This qualitative approach is enacted using the techniques of a paper and pencil survey and semi-structured interviews with 11 higher education instructors who volunteered to share with me their beliefs about adult cognitive development and its impact on their teaching.

The 11 participants who informed this study could simply be labelled as a case study. However, since grounded theory is the methodology underpinning the conduct of this research, it is worthwhile to note the use of cases in the context of this methodology. Dey (1999) distinguishes between two types of case studies. First, there are those that are "case of" studies where the participants are selected to be representative of some larger population and hence to produce generalizable results. Second, there are those that are "encased" studies in which " a case is selected without reference to any wider population or phenomenon, but studied in its own terms" (p. 226). The simple distinction between a "case of" study and an "encased" study, as Dey points out, is that the "case of" study is nomethetic, "pertaining to the discovery of general laws" while the "encased" study is concerned with "the individual, pertaining to or descriptive of single and unique facts and processes" (p. 217).

This study is an "encased" study in which the participants have been selectively chosen for reasons derived from the data and where the aim is not to generalize from the particular but to understand the case as completely as possible for its own sake. The theoretical import of an "encased" study comes from the idea that understanding one part of the social world sheds light on how the wider society works. Kosko (1994) points out that we are familiar with the idea that the whole contains parts, but we do not always recognize that the parts also contain wholes (as cited by Dey, 1999, p. 100). In other words, the part cannot be conceived of separately from the whole, and therefore the study of the particular is still a study that is a partial expression of a larger picture.

Design

This qualitative study explores the perceptions of higher education instructors as they reflect on their beliefs about adult cognitive development and the interconnectedness of these beliefs with their teaching. The development of instruments was based on eliciting a wide spectrum of perceptions about this question.

The findings of this study are based on the participation of 11 respondents, 2 who participated in the pilot study phase and 9 who participated in the final study. The pilot study phase was used to test the instruments and to inform the theoretical sampling decisions in this study. Theoretical sampling (of informants) involved selecting participants for the final study on the basis of selection criteria grounded in the data of the pilot study. Theoretical sampling (of data) involved adding questions to the instruments based on data analysis (constant comparison) that occurred during data collection. All 11 participants were asked to take part in three data collection

activities: (a) a 20-minute paper and pencil survey, (b) a 90-minute face-to face semi-structured interview, and (c) a 30-minute member check. All three data collection procedures were designed with the guiding principle of allowing the participants time for critical reflection and control of the depth and range of the data collection process.

Development of Instruments

In this study, which explores a specific aspect of adult cognitive development, it was my intention to create a data collection strategy that gave the respondents the time and control to access their own greatest cognitive resources. This intention was put into action by creating opportunities for reflective thought at every stage of the data collection.

Development of 20-minute survey.

The survey was intended to serve the following goals: (a) to form a basis for the thick description of the participants, (b) to act as a catalyst for discussion in the subsequent semi-structured interviews, (c) to allow the participants time to critically reflect about their concepts of adult cognitive development and the derivation of these ideas, and (d) to provide the respondents with an opportunity to shape the range and direction of the semi-structured interview questions. [See Appendix D: Cover Letter for Written Survey and Appendix F: Survey]

The content of the survey was developed over a period of approximately eight months based on information derived inductively from the perceptions of postsecondary instructors. I consulted three instructors in my department and four fellow graduate students who have instructional experience. Very early versions of the survey also included a fifth goal that the survey should indicate the knowledge

participants had on the topic of cognitive development. Through informal testing of these early versions of the instrument, which included literature based questions, I discovered that people tended to react to the knowledge based questions about specific concepts as though they were being tested. There seemed to be a general concern with getting the "right" answer, and this blocked the possibility of gathering data about the participants' actual perceptions instead of their declarations about what they thought they should say. I therefore dropped the deductively based questions. I was not interested in whether they could accurately identify ideas from cognitive development literature, but rather in what they *believed* about cognitive development. I considered it my role to connect their beliefs to relevant literature by looking at the concepts of cognitive development that emerged from the data and linking these concepts inductively to the literature during the data analysis stage of the research.

The final format of the survey included two types of questions: (a) questions that are intended to provide a thick description of the participants; and (b) a question that asks participants to reflect on the origins of their conception of adult cognitive development. The questions that describe the participants solicit information that has a direct bearing on their role as a teacher. They were asked, in written response format, about their academic background, teaching experience, and current teaching responsibilities. In grounded theory, comparability of populations in terms of such things as gender, age or economic status is deemed unimportant unless they become relevant in the light of emerging theory (Dey, 1999). Therefore, I asked only those demographic questions that seemed most directly to bear on a description of the teaching environment.

The question that asked participants to reflect on the origins of their conceptions about adult cognitive development presented the respondents with 13 social factors and directed the respondent "for each factor listed below, circle the number that best represents the extent of this factor's influence on your ideas of cognitive development". The choices presented on the Likert-scale were (1) no influence, (2) slight influence, (3) important influence, and (4) profound influence. The 13 factors were developed through informal conversations with higher education instructors, course instructors, and my supervisor. Their utility was assessed in the pilot study, in which the pilot study participants found that they were useful prompts for triggering critical reflection about adult cognitive development. A 14th item asked the respondents if there were other factors that had influenced their personal ideas of adult cognitive development. In the pilot study neither of the two respondents added factors; in the final study 5 of the 9 respondents wrote comments in response to this question. These additions are addressed in the findings section of this thesis.

Influences on participants' conceptions of adult cognitive development were explored to release respondents' beliefs. For example, if an instructor had a pessimistic viewpoint of the changes in adult thinking as they age, it need not be assumed that this viewpoint was formed by their interaction with students. It might, for example, be the result of media stereotyping of the abilities of older people. I began by creating a list of factors that were meant to capture influences on teacher beliefs that were both local to and remote from the action of teaching. An example of a factor that is local to the action of teaching that might influence an instructor's beliefs about adult cognitive development is "students". An example of a factor that

is remote from the action of teaching that might influence an instructor's beliefs about cognitive aging is "electronic media". I refined the list of factors through discussions with my supervisor, two other instructors in my department, and three instructors of higher education. I arrived at a list of 13 factors that were agreed upon by the group as being sources likely to influence an instructor's beliefs. The precise definitions of the factors came in part from the participants themselves since they were asked in the interview how they had interpreted the factor when they ranked it as an important or profound influence. For example, I would ask, "I see you have ranked family as a profound influence on your beliefs about how adult thinking changes as we age. How do you define family and how has family influenced your ideas about adult cognitive development?"

The forced-response section of the survey challenged the respondents to think critically about their conceptions of adult cognitive development. Their choices on the Likert-scale informed the direction of the subsequent semi-structured interviews since those factors that were rated by the participants as an important or profound influence became the starting point for questioning. Participants were informed of the link between the written survey and the subsequent interview in a letter attached to the written survey. Thus, the survey fulfilled its primary function as a catalyst for thoughtful dialogue in the interviews.

Development of the interview guide.

The principle challenge of designing an interview guide in this study was finding a way to spur conversation about a difficult topic – a teacher's beliefs about adult cognitive development. In the informal testing phase among colleagues and the

subsequent pilot study phase I found that by sending the respondents the written survey and by telling them the interview questions in a written letter, the participants had sufficient time to think about the questions before the interview. Several of the respondents in the final study expressed their appreciation of this approach because they were not "put on the spot" and they found they were able to uncover many important insights by considering the questions over time.

In keeping with the principles of grounded theory, the interview guide evolved as data collection proceeded concurrently with data analysis. Constant comparison requires the juxtaposition of new data with an evolving understanding of how the data could be organized in light of theory. Through constant comparison, I was able to observe that there are common strands arising from the comments of the participants. These strands later become more fully defined through a rigorous coding of the data, but in the short term, they were explored by adding questions to the semi-structured interview guide. This expanded interview guide was used in the subsequent interviews with the remaining respondents. This is theoretical sampling, the "flexible and dialectical process of determining data collection based on ideas within the data collection itself that is one of the cornerstones of grounded theory" (Dey, 1999, p. 5). Theoretical sampling determined both additional questions for the interview guide and sampling decisions about who to include in the study. The decisions about who to include in the study are reported in the sampling section of this chapter.

The interview guide contained six essential questions that every interview would address. Each of these six questions also had alternate formulations, which basically restated the essential questions with other vocabulary for use if a participant wanted

the question posed in another way. Finally, each question also had a number of possible probes, which might or might not be used to elicit further information. Their use depended on the substance of the participant's response to the essential question and were a way of keeping the conversation going if the respondent had little to say. The interview guide that was developed based on informal discussions with colleagues, conversations with my supervisor, testing in the pilot study phase of the study [See Appendix G: Interview Guide].

The following additional questions were created to address emerging ideas in the data and added to the interview guide. This reflects theoretical sampling at the data collection stage.

1. Consider the critical stance students take towards the material you teach. Do you see a difference between younger students and older students?
2. Do older students have a greater tolerance for ambiguity?
3. Do you hold different intellectual expectations for your seniors' classes than you do for your mainstream undergraduate classes?
4. Why are there more women than men in seniors' university courses?
5. How has your own cognition been shaped by teaching?

Not all respondents were asked these questions, since the questions above emerged from the data of earlier respondents and were explored in the interviews with later respondents. This illustrates how the theoretical sampling of data was utilized in this study.

Development of member check.

A member check is the practice in qualitative research of creating an opportunity for participants to confirm the accuracy and completeness of their statements (Gall, Borg, & Gall, 1996). In this study the interviews were tape-recorded; I then transcribed them myself, returned the transcript to the participants and invited them to make any corrections, additions or deletions to the transcript. The purpose of this step was primarily to give the participants one more opportunity to reflect on the research questions once they considered their words in print. The transcripts were mailed to respondents with a stamped self-addressed envelope so that the amended transcript could be returned to me. Two of the respondents preferred to receive their transcripts as e-mail attachments, and this request was accommodated. Eight of the eleven participants reviewed and returned their transcripts. Of these eight, three participants made very minor changes and three other participants added additional comments to clarify their expression of ideas. Within the total number of eleven respondents, three respondents did not return their transcripts. Nobody made any deletions.

As a final check, the 11 participants were supplied with an executive summary of the findings from this study and asked to comment on this material if they wished to do so.

Sampling

The sampling plan for the final study was informed by the data that was collected from the two participants who took part in the pilot study. The sampling for this research is therefore explained in two stages (a) the rationale for the sampling plan for

the pilot study and (b) the theoretical sampling decisions that were based on the data generated from the pilot study that created the sampling plan for the final study.

Sampling plan for pilot study.

The participants in the pilot study were sought from the target population of higher education instructors. A convenience sample was selected from the accessible population, which was deemed to be instructors of higher education in the Greater Edmonton Area. I relied on participants for the pilot study who were known to me and who, in my opinion, fit the profile of a good informant as described by Morse (1998) as being "one who has the knowledge and experience the researcher requires, has the ability to reflect, has the time to be interviewed, and is willing to participate in the study" (p. 73). The fact that I knew the participants in the pilot study made it possible to have many informal discussions with the respondents about their experience using the instruments and the challenges of identifying their beliefs about adult cognitive development.

Sampling plan for final study.

Based on my analysis of the data generated by these two respondents, I was able to create a sampling strategy that was grounded in the initial data of the study. Each of the participants in the pilot study had indicated that the presence of "older" students in their classrooms was an important condition for their observations about the development of cognition in adulthood. These pilot study results informed the theoretical sampling plan that would seek out individual participants who were certain to have had experience of teaching a wide age range of students.

In the sampling plan for the final study, I approached two program heads of post-secondary programs that were aimed specifically at older adults (those over 60) and requested their assistance in identifying respondents who (a) taught an academic higher education course to senior students, (b) taught or had taught in a traditional higher education environment with undergraduate or graduate students, and (c) were deemed by their program head to be good informants and reflective practitioners. The program heads identified such individuals and I sent these possible participants a recruitment letter hoping to interest them in my study. At one site these letters were first sent to the program head who filled in the names of the instructors she had selected and then mailed the letters on my behalf to the potential participants. At the second site the program head supplied me with a list of people who she believed would make good informants and who would be interested in my study. In this case, I sent the recruitment letters directly to the possible participants. This recruitment strategy resulted in nine volunteers who contacted me by phone or e-mail and kindly agreed to participate in my study. These nine participants, like the two participants in the pilot study were from the accessible population of higher education instructors in the Greater Edmonton area.

The sampling strategy has the strength of being derived from the data of the pilot study and therefore conforms to grounded theory's concern with theoretical sampling. Additionally, the sampling strategy strengthens the full study by defining the limits of the case under study and has also facilitated the development of a uniform frame of reference in the data concerning the influence of "older" students since in the pilot study it was observed that while one respondent considered students of about 30 years

of age to be "older", the other respondent considered students between 40 and 50 to be "older". In the full study "older" students are those who are 60 or more years of age.

Consent and Confidentiality

In keeping with the ethical guidelines of the University of Alberta, consent and confidentiality guidelines were strictly adhered to during the course of this study. Ethics approval was sought from and granted by all participating institutions. These ethics approvals covered at least one and in some cases two workplaces of the participants in my study.

The guarantees of ethical probity were communicated to the participants in the following manner. The nine participants of the final study first received a copy of the recruitment letter that specified the topic of the research, the format of the data collection, the time commitment requested, the availability of transcripts, and the promise of an executive summary. Specific to the ethical guidelines of the University of Alberta, the letter promised confidentiality by omitting the names of respondents, their institutions, and any individuals mentioned by name during the data collection. Further, the letter stated that I would transcribe the interview tapes myself and erase the tapes upon completion of the study. Participants were informed in this letter that they had the right to opt out of the research at any time for any given reason. The letter also contained the statement, "deception will not be used". Immediately before the taped individual interviews began, each participant was handed a second copy of this letter with the ethical considerations highlighted and were verbally reminded of their rights to confidentiality and to opt out of the research. After this reminder, each participant was handed a consent form which stated the purpose of the research, the

use of the data in a master's thesis, the potential use of data in conference presentations and articles, the right of the respondent to opt out, and the confidentiality of names of respondents, identities of other persons, specific course titles and institutions. By signing the consent form, the participant accepted that the recruitment letter and the statements in the consent form represented a full disclosure of the purpose and conditions of the study. [See Appendix E: Consent Letter]

Program heads who assisted in the selection of participants were given a letter very similar to that received by the participants in regard to outlining the purpose and conditions of the study, but which included a request for their assistance in identifying candidates for the study.

The two participants who were the subject of the pilot study were not provided with a recruitment letter. Instead they were read a consent statement at the beginning of their individual interview. Participants then stated their name to grant consent. When the pilot study findings indicated that the final study could proceed productively, the consent of the two pilot study participants to use their data in my thesis and possibly in conference presentations or articles was sought and obtained through the formality of the same consent form described above.

I typed a verbatim transcript of each interview tape omitting the specific names of respondents, other persons, courses and institutions from the transcripts except in cases where respondents were referring to public figures such as Plato or authors such as Dewey. I latter created pseudonyms for the respondents that conform to the gender identification of their own names but in all other regards have no similarity to their

proper names. These invented names appear in all quotations from the transcripts. No participant expressed any concerns about ethical considerations at any time.

Data Collection

The data were collected in the pilot study from two respondents and in the final study with nine respondents using first, a written response survey and second, a face-to-face semi-structured interview The primary purpose of the written survey was to allow the participants a chance for reflective thought before the interview and to "open up" the dialogue in the interview to the participant's perceptions of the questions under discussion. Each respondent was sent a copy of the survey at least 3 days before the interview, and each brought the completed survey to the interview. No two interviews were exactly alike during the pilot study or the final study since each was mediated in part by the participants' responses to the survey questions, by their unique perspective on the topic under discussion, and by the informal nature of the interview settings. All were asked the essential questions in a consistent order, but there was a considerable variation in probes.

One interview took place in a private residence, four interviews took place in the conference room of my department at the university, one interview took place in my office, one interview took place in a respondent's office, and four interviews took place in coffee shops or restaurants. All locations and times were determined by the participant's preference. The participants were told that the interview would take approximately 90 minutes and 8 of the total 11 interviews conformed roughly to this time frame. Of the remaining 3 interviews, one was 40 minutes long, one was 70

minutes long, and one was approximately 2 hours long. The data were collected over a four-month period.

The participants were provided with an interview schedule along with the written survey, and thus were aware that their responses to the first question on the written survey would shape the first set of questions at the interview. They also had time to reflect on the other interview questions before the interview if they chose to do so.

The conduct of the interviews themselves was based on a semi-structured interview format in which a number of predetermined interview questions were formulated to guide the interview. Six essential questions were asked in a consistent order in each interview. The goal of a semi-structured interview is to create an informal atmosphere in which a natural discourse between interviewer and participant can occur, but to also cover some basic questions, identified as essential questions, in each interview. No two interviews were alike since there was considerable variation in the time spent establishing a rapport with the respondent and the number and types of probing questions that were used with each respondent, and of course, since their individual responses to the survey had informed some of the content of the interview, the direction of each interview was determined in part by the respondent themselves. The semi-structured interview allows the interviewer the freedom to move beyond the preset list of questions and to probe answers to the questions. In this way, interviewers are more responsive to answers that they had not anticipated when they planned the interview (Berg, 1998). I chose the semi-structured interview format because it allowed the participants opportunities to speak about aspects of the interview questions that were particularly important or interesting to them.

Once the interviews were complete, I transcribed them verbatim and supplied the respondents with a copy of the typed text so that they could evaluate whether the transcript captured an accurate representation of their opinions and ideas. They were invited to point out errors or to make additions that would more perfectly capture their viewpoints. As previously mentioned, 8 of the total 11 respondent returned their transcripts, 6 of these made some additions to more clearly express their views, but nobody made any deletions.

Finally, the respondents were provided with an executive summary of the findings from this study in which I present my interpretation of the data derived from the entire group.

Data Analysis

In accordance with the grounded theory methodology adopted in this research, data collection and data analysis proceeded simultaneously throughout the course of the research. The purpose of this strategy is to enhance the theoretical relevance of data collected in the latter stages of the study (theoretical sampling). The data analysis was conducted through the open coding, axial coding, selective coding and conditional matrix procedures of grounded theory (Dey, 1999 & Strauss & Corbin, 1990 & 1998). Open coding identifies the conceptual categories that reduces the data, axial coding highlights the social process connections between these categories, selective coding

identifies overriding priorities in the data, and the conditional matrix is a diagrammatic aid for considering the social process connections identified through coding.

Open Coding

Open coding is the initial analysis process in grounded theory that involves the "breaking down, examining, comparing, conceptualizing and categorizing of data" (Strauss & Corbin, 1990, p. 61). There are two tasks for the analyst: first to break down and examine the data and second, to compare, conceptualize and categorize the data.

Breaking down the data.

The first stage of data analysis in open coding where the data is broken down and examined can be likened to taking a very rough inventory of the topics and issues generated in data collection. The data analysis of each individual's contribution began as soon as data were collected from that individual. It initially involved compiling the answers from the paper-and-pencil survey to provide a thick description of participant characteristics. The compiled answers to items on the written survey pertaining to the influences on the participant's perceptions provided a basic profile of the factors that shaped their conceptions of adult cognitive development. The forced choice of the Likert-scale has produced a set of numbers that are descriptive of the importance that each individual respondent attaches to the various factors that may have shaped their understanding of adult cognitive development.

Next, in the analysis of each individual set of data, the interview tapes were transcribed verbatim. I undertook this task myself so that I could begin making rough coding notes to gain an understanding of the material as I typed. Each transcript

was then open coded. The breaking down of data in this study was done at the level of sentences since, as Strauss and Corbin (1990) predict, this option of coding by sentences allows the researcher to key on major ideas and proves to be "ever more useful as the analysis progresses" (p. 73). In several instances sentences were grouped together in order to preserve a holistic understanding of the data and to preserve the intended meaning of the respondents.

The analysis next requires an examination of the meaning of each sentence, first in isolation, and next, in comparison to other sentences to approximately group the data. Strauss and Corbin's directive to systematically break down and "examine" the data before concepts and categories begin to be developed contains an underlying difficulty in that it is hard to resist conceptualizing the data from the earliest stages of analysis (Dey, 1999). At first it is possible to simply break the data into sentences, but soon any researcher will begin to notice commonalties, contrasts, and other relationships in the data. A "fine-grained" approach where the researcher toils through the data breaking it down and examining it without conceptualizing or connecting the data is "appropriate, therefore, only at the outset of the analysis, when the initial categories have still to emerge" (Dey, 1999, p. 99). As I worked with early study data, I developed an outline of topics and issues present in the data and refined this list as the study proceeded. The breaking down and examination of data resulted in an inventory of data information that had 9 headings and 73 subheadings. [See Appendix H: Initial Coding Structure for Open Coding, Breaking Down, Comparing, and Examining Phase]

Conceptualizing and categorizing the data.

The second task in open coding is the conceptualizing and categorizing the data. The key difference between breaking down the data into groups and conceptualizing the data into categories follows from the fact that categories in grounded theory do not just identify a set of things. The words that identify the categories convey an idea (Dey, 1999, p. 49). A concept is attached to a category because inside the category is a whole distribution of named "things" or cases. The names allow us to identify the cases but those names are not intended to characterize the case or allow comparisons between cases. The concept attached to the category, however, is created with this intention. It takes a concept to characterize and compare between cases and this is the essence of category development. For example, spoon, nail, tractor, tin foil are all just names; however, if they are attached to the concept "recyclable metal" they can be characterized and compared in relation to one another.

The result of the first stage of open coding, where I broke down and examined the data, was a list of named cases. The result of the second stage of open coding, where I conceptualized and categorized the data, was a set of generalized ideas that emerged from the data itself. Although they are described separately, the two stages of open coding happened concurrently because I noticed conceptual ideas in the data from the earliest stages of analysis. As I worked through the open coding, I kept "code notes" or memos, which gave initial names to the concepts as I began to notice them in the data. Several of the categories that held up during subsequent data collection and data analysis had their origin in these rough code notes. I began the work of creating categories by looking for conceptual commonalities in the data.

Grounded theory uses a very particular vocabulary to describe categorization. Categories are "a classification of concepts that appear to pertain to a similar phenomenon" and within each category there are attributes and characteristics, which are termed properties. Dimensionalizing in grounded theory is the process of assigning the attributes or characteristics pertaining to a property along a continuum. (Strauss & Corbin, 1990, p. 61). To fully describe a category it is necessary to identify its properties and dimensions. As an example from this study, the category of "stimulus" describes a phenomenon that contains the property "challenges to cognition", and this property is dimensionalized as "static ↔ increasing". [For a chart of the complete conceptualization, see Appendix I: Open Coding, Conceptualization Phase.]

Identifying the phenomena present in the data involved a careful conceptualization and categorization of the characteristics and attributes (properties) of these phenomena. Phenomena are referred by Strauss and Corbin (1990, 1998) as categories, but it is helpful to remember that the analytic process of *categorization* applies to the formation of categories, the identification of properties and the labelling of dimensional ranges since all are fashioned by setting or describing boundaries between concepts. In this study, the analytic process of categorization during open coding involved working inductively and deductively from the literature, and using selected portions of Medin and Brasalou's (1987) strategies of category development. The analytic process of categorization is described now.

Initially, I worked deductively and inductively as I moved through the category development. I worked deductively from the theory in literature to what could be

found in my data, and I worked inductively from the particular information in my data to theory from literature that could be linked to these ideas. An example of deductive category development was roughly grouping sentences that addressed cognitive development from sentences that did not address cognitive development. To do this, I needed to know the literature of cognitive development well enough to recognize what I was reading. When Fiona tells me that her senior students often joke with her about repeating everything she says, I recognize this deductively as a statement related to cognitive development because my reading tells me that as we age, message reception is not only a function of hearing (Wingfield, 1999). The function of the deductive use of literature is to enhance my theoretical sensitivity to the data. On the other hand, some categories are derived inductively, especially categories relating to teacher beliefs. The concept "stimulus" was a word that I attached to a then unidentified grouping that seemed to belong together and needed a word to adequately describe the idea unifying this category. This is an example of moving from a set of data and looking for a concept descriptor within the literature (induction) to identify a category. The function of the inductive use of literature is to suggest concepts that can be attached to groupings that have already emerged from the data. A lot of the time though, it was very difficult to differentiate between those ideas that arose from deduction and those that arose from induction.

I was guided in my inductive and deductive development of categories, in part, by Medin and Brasalou's (1987) four strategies of category development. The first strategy in their theory of category development is attached to the creation of rules in which, as Dey states, "A well defined category will have attributes that are jointly

sufficient and singly necessary to identify the category. Only members of the category possess all of these attributes and all members of the category will possess each of them" (p. 71). This method of category development worked well for some categories in which the attributes of the category did not shade from one attribute into another attribute. Attributes or characteristics of categories are known as properties in grounded theory (Strauss & Corbin, 1990). Some properties of a category are easily distinguished from one another such as when I was distinguishing between a teacher's practice and a teacher's stated preferences. In other instances, it was necessary to make judgements about where the properties of categories should be divided. In these cases, I resorted to Medin and Brasalou's fourth strategy of category identification that they call "boundary definitions" and which they define as "involving comparison of attributes at the margin" (1987, p. 416). Boundary definitions are used when the characteristics of a category seem to be on a continuum and the researcher must make a judgement where one property of a category shades into the other. In other words, the boundaries are not naturally occurring, as they would be if, for example, we were trying to distinguish apples from oranges, but rather the boundaries are a judgement of the researcher as they would be if we were trying to distinguish ripe apples from unripe apples. Where "fuzzy" boundaries exist, the researcher can turn to cognitive research to understand how decisions are made about where to set the boundaries (Dey, 1999).

A consideration of the role of prototypes, the importance of idealized cognitive models, and graded memberships sheds some understanding on how the mind works to create divisions between elements when we are categorizing (Lakoff, 1987). The

role of prototypes and the importance of idealized cognitive models, understood as the reference points a person holds in their mind as they make decisions about how to categorize ideas. We use prototypes when we group things together according to resemblance to a type "distinguished in terms of ideal attributes that may have little if any relation to features common among other members" (Dey, 1999, p. 252). For example, I might group all education studies together because they have a resemblance to the ideal attribute of advancing our understanding of learning even though on examination there may be few characteristics that are common to all of them. Lakoff (1987) points out that categories are based on prior cognition that is, in turn, based on our cultural understanding of conventions for grouping things as we do. We understand what the world is like because of the experiences we have had in that world. A researcher, especially a researcher in social sciences, must therefore acknowledge that they are part of the social process that they study and identify their conscious assumptions as best they can.

Graded membership acknowledges that the boundaries between categories are usually fuzzy since some members of the category are more fully a member of the category than others. To return to the example of ripe and unripe apples, we can set a boundary between these two groups, but some apples will still be more clearly ripe than other members of the "ripe" group. We might then develop a system of grading where some apples are "very ripe" at one end of the continuum while at the other end of the continuum within the group some apples are "barely ripe". In grounded theory, dimensionalizing addresses the concerns of graded membership.

Ending open coding.

The defence of category boundaries, however created, is based on the careful memoing required by grounded theory in which the researcher notes why the boundaries between one category and another are placed as they are. I noted my decisions about categorization as I set rules and boundaries for the categories. Throughout this process I used the constant comparison strategy, comparing one data set with another data set, to determine whether the emerging categories remained useful as more and more data was collected and analyzed. Additionally, an independent rater, a fellow graduate student with research interests similar to my own, was recruited to double code the data to test the plausibility of the categories (phenomenon). Reliability was assessed using the following formula: # of agreements/ total # of agreements + # of disagreements (Miles & Huberman, 1994, p. 64), and this calculation resulted in a reliability rating of r = .96 [See Appendix J: Reliability Check, Categories – Properties – Dimensional Range]. The independent rater did not have access to any information that would identify the participants or their institutions.

Categories have two roles in grounded theory. The first role of categories is to provide a detailed examination of the structure and substance of the data. The second role of categories is to alert the researcher to potential ideas to explore further (Dey, 1999, p. 32). The data analysis was used to guide theoretical sampling from the earliest stages of the research and this theoretical sampling continued until theoretical saturation was reached. Theoretical saturation is the point at which no new ideas emerge from the data. As Dey (1999) describes Strauss's use of the term theoretical

saturation, "It is the capacity of the data to generate new ideas that is exhausted here, and not the accumulation of evidence to support those ideas" (p. 116). Theoretical sampling had the effect of focussing the mass of the data to a manageable size that, I am confident, has been rigorously analyzed. Once the key process of open coding established a theoretically saturated database, axial coding, selective coding, and the conditional matrix followed. Axial coding, selective coding and the conditional matrix do not add new ideas to the data, but rather they highlight how concepts already present in open coding can be viewed from another perspective.

Axial Coding

The analysis of the relationship between categories (phenomena) is known in grounded research as axial coding. In this stage of analysis, the data within each category (phenomenon) are rearranged according to a fixed coding paradigm with the intention of highlighting the social process that underlies the category (phenomenon). This involves coding each piece of data (concept) within a category (phenomenon) "in terms of conditions, context, strategies, and consequences" (Dey, 1999, p. 106). This is a causal perspective on the data that highlights the process of how actors involved in the phenomenon under study act and how they interact with one another. The point of doing axial coding is that its application will allow an understanding of process to emerge from the data (Strauss & Corbin, 1990, p. 143). This goal is accomplished by placing the data from each category (phenomenon) generated by open coding into the paradigm of conditions, context, strategies, and consequences. The whole analysis in axial coding is informed by recognizing the constant state of change that underpins the social process revealed in axial coding. Change is conceptualized in this research as

turning points in the social process that create movement to a particular result (Dey, 1999, p. 151). The social process in this research is the force that creates a teacher's beliefs about cognitive development, and the result is the impact of this belief structure on the educational environment. In this study, axial coding highlights the process by which teachers of higher education become aware of the possibilities of adult cognitive development and the process of interaction with others that is created when they take these attitudes into the educational environment in which they work. The axial coding of each category (phenomenon) was accomplished by concurrently doing these four tasks:

1. Considering the possible relationship of categories established through open coding with the sub-categories of conditions, context, strategies, and consequences;
2. Looking for support of this relationship in the data;
3. Continuing to consider the properties and dimensions of the categories established through open coding looking for evidence of change when placed in relationship with other data;
4. Using these observations to consider how the phenomenon of teacher's beliefs about adult cognitive development behaves as a social process.

Axial coding makes it possible to examine the relationship between categories by examining how each category (phenomenon) compares to the other categories (phenomena) for conditions, context, strategies and consequences, and this, in turn, supports decisions made in selective coding. [For a chart of the results of this analysis, see Appendix K: Axial Coding, The Underlying Social Process.]

Selective Coding

The last coding stage in grounded theory is selective coding, which results in the identification of a core category (overarching phenomenon) in the research. Selective coding prioritizes the results of analysis by connecting ideas and achieving theoretical integration through narrative. Strauss and Corbin state "to achieve integration, it is necessary first to formulate and commit yourself to a story line" (1990, p. 119). In this research the story line is not chronological but rather describes the connections between private influences and public implications around the phenomenon of teachers' beliefs regarding adult cognitive development. Selective coding is more abstract than axial coding and involves seven basic activities (as described by Strauss & Corbin, 1990, 1998):

1. Explicating the story line;
2. Identifying the story;
3. Moving from description to conceptualization;
4. Making a choice between prominent ideas to identify a core category;
5. Determining the properties and dimensions of the core category;
6. Relating other categories to the core category; and
7. Returning to the story.

The creation of a core category highlights the researcher's role as the primary tool of data analysis in qualitative research since it is up to the researcher's judgement to determine whether the core category is effective. To be effective "a core category must be central, stable, complex, integrative, incisive, powerful, and highly variable" (Dey, 1990, p. 111). A "powerful" core category has the explanatory force to carry

the narrative that is developed around selective coding. [For the results of this process, see Appendix L: Selective Coding, The Overarching Narrative.]

Conditional Matrix

The final level of analysis in grounded theory "involves identifying the conditions in which interaction is embedded through a conditional matrix, and then tracing the conditional paths through which the conditions result in specific consequences" (Dey, 1999, p. 152). The conditional matrix can be visualized "as a set of circles, one inside the other each [level] corresponding to different aspects of the world . . . In the outer rings stand those conditional features most distant to action/interaction; while the most inner rings pertain to those conditional features bearing most closely upon the action/interaction sequence" (Strauss & Corbin, 1990, p. 161). Interaction refers to processes, specifically in this research to the learning experience, while action refers to the "active, expressive, form of self", specifically in this research to the action of teaching (Dey, 1990, p. 152). Therefore, the inner ring of the conditional matrix is occupied by the action of teaching and those social aspects of the world that are most remote from the action of teaching occupy the outer rings. A conditional path links these rings since the action of teaching is influenced by conditions flowing inward through these increasing personal aspects of the social world, and the action of teaching also creates consequences that flow outward along the same conditional path toward the increasingly remote levels that represent the wider world. The job of the researcher is to specify the levels of the conditional matrix and to trace the conditional path between these levels. In this study, the levels of the conditional matrix emerged from the categories identified in open coding. For example, "family" is a level that is

descriptive of local interaction near the centre of the matrix, while "regard for learning" is an influence that can be placed at community level of the matrix. Tracing an event, incident or happening through the levels of the matrix established the conditional paths.

The use of the conditional matrix in this work is inspired by what Strauss & Corbin (1998) call an "awareness" context which comes from their original studies using the grounded theory methodology in which they studied the awareness of dying and employed the conditional matrix to chart the conditional path by which a terminally ill person becomes aware that they are dying. By using the matrix, I found that I could utilize my data to chart how higher education instructors become aware of the changes in thinking that people (including themselves) experience over the course of their lifespan. However, it is not events that mark the fixed end points of the conditional path as with a terminally ill person where one moment they are unaware they are going to die and the next moment they are aware they are going to die. The development of beliefs is marked by incidents from which people generalized their beliefs or from happenings that occurred over time, and there are no fixed boundaries to the conditional path since current beliefs are always in a state of development and refinement as people continue to grow. Teacher beliefs are hard to pin down, and this elusive quality may explain why so few studies in education consider their influence on the educational environment or, conversely, consider the impact of the educational environment on teacher beliefs. The conditional matrix has analytical value only in that it suggests the flow of societal process in relation to the topic of teacher beliefs

about adult cognitive development and shows the synchronicity of conditions and consequences.

Trustworthiness of the Study

The credibility of this qualitative study rests on the careful description of researcher beliefs, the neutrality of the researcher, and the ability of the researcher to faithfully present the views of the research participants in relation to the phenomenon under investigation. The transferability of this study rests on the plausibility of the theory-data connections and the rich description of findings supported by direct quotations from the participants that will allow readers to assess what is meaningful to them and conveyable to their own situations. The dependability and confirmability of the study rest on the systematic and rigorous use of various coding strategies to thoroughly analyze the data and on an audit trail supported by notes, colleague checks of coding, and member checks. An account of how I sought to incorporate research features that ensure credibility, transferability, dependability, and confirmability in this study follows.

Credibility is linked to researcher characteristics because in qualitative research the researcher, as the primary tool of data collection and data analysis, has a close relationship with what is being studied (Denzin & Lincoln, 1998). Clear statements about the researcher's influence on the study are therefore necessary to enhance the trustworthiness of the study. This chapter contains a careful scrutiny of why I chose the methodology of grounded theory, a listing of the specific methodological assumptions and techniques that were used in my study, and a full description of the analysis to which the data was submitted. In Chapter 1, I presented an assessment of

my research assumptions. All these statements are included to enhance the believability of the study by giving a frank account of my role in the research. Further, the grounded theory practice of completing an extensive literature review only after data analysis is well under way means that research is also minimally influenced by assumptions derived from past research conducted by others.

Transferability has been addressed by providing coherent accounts of process and rich descriptions of findings. The plausibility of this study is mediated by the merit of the theory data connections that are detailed in the findings chapter of this thesis. The specificity of open coding, axial coding, and selective coding techniques illustrate how theory is grounded in the data of this study. Further, these theoretical ideas are connected to literature in Chapters 4 and 5, thus enhancing the conclusion validity of the study. Those people who find the theory data connections to be legitimately derived from the data and logically explored through literature may judge the findings and conclusions to be transferable to their own situations. The study aims to create contextual comprehensiveness through "richness of concept development and completeness" (Strauss & Corbin, 1987, p. 161). The ideas uncovered in "encased" studies are transferable because they are deemed by the reader to be credible expressions of the phenomenon under study, the connections between data and theory are plausible, and the reader recognizes the description of the particular as illustrative of the whole in the same way that the discernment of the pieces of a jigsaw puzzle assist the solution of the whole puzzle.

Choosing and detailing a rigorous course of data analysis enhances the dependability and confirmability of this study. The study is made dependable by the

practice of fully coding the data according to the rigorous principles of open coding to fulfill "the underlying assumption of grounded theory . . . that we can recognize appropriate categories with sufficient consistency to ensure that categories are stable enough conceptually and empirically" (Dey, 1999, p. 252). The study is confirmable on a procedural level in that an audit trail exists that is supported by memos, colleague checks of coding, and member checks. I kept coding notes (memos) that document the reasons for coding categories as I did, and a colleague checked the placement of data in open coding categories. Verbatim transcriptions and the member checking procedures described earlier in this chapter help substantiate the claim that the data included in this study reflect the meanings intended by the participants. As Woods (1996) points out, it is challenging to quantify dependability in studies where the researcher has an integral and personal role in the interpretation of data, but "internal validity can be enhanced by depth of study" (p. 154). I suggest that dependability is enhanced by the extent of data analysis and theoretical sensitivity through reference to literature employed in this study.

Triangulation was used in two ways in this study. First, data triangulation is used because the written survey and the interviews produced different types of data. However, since the written survey was primarily a catalyst for the interview data that were later generated, this is not the strongest use of triangulation in this study. The second and stronger use of triangulation is theory triangulation, in which multiple perspectives were used to explain a single set of data (Janesick, 1998, p. 46). Theory triangulation is established by linking the emergent categories from the data to theory derived from literature. Drawing on the 1992 work of Flick, Robert Stake (1998)

makes this observation about triangulation, "Triangulation has been generally considered a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation. But, acknowledging that no observations or interpretations are perfectly repeatable [within a constructivist paradigm], triangulation serves also to clarify meaning by identifying different ways the phenomenon is being seen" (p.97).

This research was conducted from a constructivist paradigm, the qualitative methods were chosen based on a belief in the participants' ability to describe the social processes in which they are involved and categories were developed to the point of theoretical saturation in which no new ideas emerged from the data. This research was not concerned with frequency or repeatability of responses and so triangulation in this study is concerned with elucidating the various viewpoints, among participants and in literature, from which the phenomenon of teacher beliefs about adult cognitive aging can be seen.

Chapter Four: Findings from Survey and Open Coding Description and Conceptualization

The findings in this chapter are presented in two parts. First, the descriptive findings specify the results of the written survey in which the teaching background of the respondents and influences shaping respondents' beliefs about adult cognitive development were canvassed. Second, the conceptual findings that were a product of open coding are presented interspersed with excerpts from the respondents' transcripts and theories from literature. My analysis of data from this study using the methods of grounded theory has extended the review of literature beyond the studies of cognitive change, theories of student development, and beliefs about cognitive change discussed in chapter two. In the findings chapters, the results of this study are integrated with both theories from the review of literature and with theories from additional literature sought out in response to concepts that emerged from the data.

Descriptive Findings

The written survey provided a description of each participant's academic background, experience as an instructor, and current teaching duties. In addition, the forced response section of the questionnaire provided a basic profile of participant opinions.

Description of Participants

There were eleven higher education instructors who participated in this study. In order to set the findings of this study in the context of the respondents' teaching practice, a profile of each individual's involvement with education with an emphasis on his or her education and teaching experience is provided. Pseudonyms are used to differentiate the respondents from one another. The pseudonyms match the gender of

the participants but have no other resemblance to their actual names. The participants vary as to education, field of study, teaching experience and current instructional duties.

Adam has three economic degrees and a PhD in Political Science. He has taught in universities and colleges in three different countries. He began his career as a teacher and research assistant in university and has since become involved with many volunteer positions teaching astronomy to the public. He currently teaches political science and economics in a postsecondary institution and is involved in academic programs for senior learners.

Barbara has a diploma in broadcasting, a Bachelor of Arts in English, and a Masters degree in Theological Studies. Barbara has taught creative writing to senior learners for the past seven years, has been involved in writing workshops for junior high and senior high school students, has taught public relations writing and editing in a postsecondary setting to adults ranging in age from 18 to their mid-forties. She currently teaches poetry studies and creative writing in programs aimed at senior learners.

Cathy has an honours degree in science, a Masters of Arts and a PhD in Anthropology. Her teaching experiences began as a teaching assistant instructing third and fourth year undergraduate anthropology courses as well as labs, teaching anthropology as a sessional instructor, and working abroad in Kenya instructing university level archaeology courses. Her current teaching duties include teaching first year anthropology courses. She notes that the age range in these classes

is typically from 19 to 40 years, and she is also involved in academic programs for senior learners.

Donald holds a Bachelor of Arts in Political Science, and a Masters and PhD in Soviet Studies. He has been a part-time history instructor at various liberal arts colleges for the past seven years, and has considerable experience teaching academic extension courses to senior learners. His current teaching duties include undergraduate survey history courses and courses for senior learner programming. The class sizes in history typically are 30 to 40 students while the classes for seniors are typically 15 to 20 students.

Elaine's most advanced degree is a Masters of Art in Art History [other degrees were alluded to in the interview, but not identified by the respondent]. Her teaching experience includes 12 years teaching elementary school followed by experience teaching undergraduate Art History courses at various postsecondary institutions and instructing academic programs for senior learners. Her current teaching duties include instructing an undergraduate art history courses with approximately 50 students, and teaching a senior learner program with approximately 25 students.

Fiona holds a Bachelor of Arts in Foreign Languages, a Masters of Arts in German, and a PhD in Comparative Literature. Her teaching experience includes working as a sessional instructor in programs for senior learners at the undergraduate level. She has taught comparative literature courses, teaching composition, conversation, cross-cultural relations, and various other courses overseas. Her current teaching duties are comprised of undergraduate sessional contracts and teaching academic programs for senior learners.

Gordon holds a Bachelor of Arts, a Masters degree, and a PhD all in Anthropology. His considerable experience ranges form being a teaching assistant early in his career to being an Assistant Professor, an Associate Professor, a Full Professor, and finally, a Emeritus Professor with the full undergraduate and graduate teaching duties normally associated with these positions. He currently teaches academic courses for senior learners and typically has a class size of about 48 students.

Harold has an academic experience of a wide range of arts topics including political science, philosophy, history, psychology, Native studies, and economics. He holds a master's degree in Political Science and is currently completing a PhD also in Political Science. His teaching experience includes instructing first and second year political science courses and delivering academic courses to senior learners.

Ian has a Bachelor of Arts, a Masters of Arts and a PhD. He has been on the faculty of a political sciences department and on the faculty of an educational administration department. The respondent did not describe his teaching experience, which is no doubt extensive. His current teaching duties are teaching academic courses to senior learners.

Jake holds a BSc, a MSc and a PhD all in Mathematics. He has 9 years of teaching experience with undergraduates in a variety of post-secondary institutions, and his current position includes the delivery of first and second year undergraduate courses and labs. The typical class size for these courses is approximately 50 students.

Karen holds a social work diploma, a Bachelor of Education in Secondary Education, and is currently completing her Master's degree. She has 12 years of teaching experience, which includes teaching junior and senior high, and teaching

courses in a postsecondary institution. Her current duties involve course delivery to classes of about 30 students who range in age from 18 to 50 years.

Basic Description of Factors Influencing Participants' Beliefs

The results of the forced response section of the written survey have a limited value in that they show a starting point for conversation in the interview, but the richer source of data resulted from the interviews since many participants uncovered insights into their beliefs about adult cognitive development through the discourse of the interview process and by reflecting on their comments as they reviewed the transcripts of their interviews. The influences that formed participants' conceptions of adult cognitive development are more complex than the ranking of influences shown in Table 1 on the following page would seem to indicate.

Table 1: Ranking of Factors that Have Influenced Respondents' Personal Beliefs About Adult Cognitive Development

1 – No Influence 2- Slight Influence 3-Important Influence 4 – Profound Influence

Factor	A	B	C	D	E[1]	F	G	H	I	Mean
Family	3	4	4	3	2	4	3	4	4	3.4
Friends and Associates	3	3	3	1	2	3	2	3	4	2.7
Colleagues	3	1	3	3	2	2	2	3	2	2.3
Your teachers/instructors/mentors	2	1	4	4	2	3	4	4	3	3.0
Students	2	4	4	4	2	3	3	3	4	3.2
Academic courses you have taken	2	2	2	1	1	3	3	2	2	2.0
Professional conferences	1	2	2	1	2	3	1	1	1	1.6
Reading	2	3	3	2	2	4	3	2	4	2.8
Electronic Media (television, radio, internet, etc.)	3	1	4	2	1	3	1	2	2	2.1
Cultural Media (theatre, music, dance, film, visual arts, etc.)	2	3	2	1	2	3	1	1	4	2.1
Hobbies and pastimes (travel, sports, games, etc.)	2	2	4	1	2	4	2	1	3	2.3
Teaching	2	4	4	4	-	3	4	3	4	3.0
Non – teaching work experience	4	3	4	1	1	3	3	2	4	2.8
Other factors? (Written comments volunteered by respondent) These comments were added to the data pool that was open coded, axial coded and selective coded.	My own personal develop-ment, my wife sons, friends, Germanic professors, music	Teachin g adults – turned to this out of necessit y – good decision	-	Personal reflection, one's own experienc es	-	No	?	Interact ion with senior student s	Of family, I want to stress my wife of many years. And my active church life of many years, of course, I reflect upon myself.	

[1] Respondent E commented that these factors had a holistic influence on her beliefs about adult cognitive development and so she did not wish to credit any factor as being more important than the others. In this interview, we talked about all the factors and respondent E offered many remarks about her beliefs concerning adult cognitive development.

The ranking of influence based on mean scores from Table 1 is (a) family, (b) students, (c) teachers/instructors/mentors, (d) teaching, (e) non-teaching work experiences and reading, (f) friends and associates, (g) colleagues, and hobbies and pastimes, (h) electronic media and cultural media, (i) academic courses, and (j) professional conferences. The two respondents involved in the pilot study used a survey form with a slightly different format that was improved upon before use in the full study. The rank ordering of factors from the pilot study produced results with the following ranking: (a) teaching; (b) students; (c) family; (d) professional reading, electronic media, friends and associates, and colleagues; (e) teachers/instructors/mentors and hobbies/pastimes; and (f) professional conferences and recreational reading. These rankings have value only in that they show the general direction of the conversation in the interview; however, the importance that respondents attach to the influence of family, students and the teaching experience was strongly supported through the processes of open and axial coding of the interview data.

Conceptual Findings

The open coding phase of data analysis began with breaking down, comparing and examining the data and resulted in the identification of four categories (phenomenon) along with their properties and dimensional ranges. The properties and dimensional ranges of the four categories are listed in Table 2 on the following page.

Table 2: Concepts Emerging from Open Coding

Category	Properties (Attributes or Characteristics)	Dimensional Range (Location of Properties Along a Continuum)
1. **Stimulus**	Challenges to Cognition Inspiration for growth Supports for change	Static ↔Increasing Past ↔ Present Discourages ↔ Encourages
2. **Clues**	Observations Comparisons Self-reflection	Sensory ↔ Intuitive Different ↔ Same Surface ↔ Critical
3. **Reactions**	Disposition Practices Preferences	Pessimistic ↔ Optimistic Unresponsive ↔ Responsive Aversion ↔ Enjoyment
4. **Views**	Cognitive Change and Aging Teacher's Role	Loss↔ Gain Individual ↔ Shared Peripheral ↔ Central

In order to tell a clear analytic story in this narrative account of the findings and to a give authentic representation of the respondents' comments, I describe the levels of conceptualization and illustrate each with a quotation from the participants' transcripts. Elbaz (1990) maintains that studying teacher thinking has the effect of giving teachers "voice" within the educational environment. He says, "Having 'voice' implies that one has a language in which to give expression to one's authentic concerns, that one is able to recognize those concerns, and further that there is an audience of significant others who will listen" (p. 17). When we study teacher beliefs to illuminate the links between teachers' thinking and teachers' action, we honour the

people who we are studying by respecting their voices within the educational environment As Ely, Vinz, Downing, and Anzu (1997) say about writing qualitative research, "Throughout the process of analysis we have been trying to present the meaning of our participants' experience in their own words and from their points of view" (p. 204). The presentation of the findings of open coding includes specification of the levels of conceptualization, representative respondent comments, and links to ideas in the literature.

Stimulus

The first category, derived from open coding, is defined to include the events or happenings that are identified by the participants as affecting cognitive change – these arouse cognitive development. The category of stimulus is characterized by the properties of challenge to cognition, inspiration for growth, and supports for change. These are presented below with supporting passages from the respondents' transcripts.

Challenges to Cognition

This property of stimulus is those difficult or demanding tasks that enhance or provoke thought. Participants spoke about experiences that seemed to cause a shift in how they themselves were thinking about tasks both mental and physical that made a difference to how they think. The dimensional range of this property extends from challenges that are static, usually those challenges that were encountered in the past but whose effects were still felt in the present and to challenges that are increasing, usually those challenges that present demands or ambitions that are never fully resolved or attained. This property of stimulus to cognition contained a wide array of ideas.

Reading was an important source of personal cognitive challenge that was perceived by some participants to alter *how* they thought and not simply what they thought about. Fiona comments on how the act of reading itself, through the demands it places on the reader, is a source of cognitive stimulus.

> I was thinking about the fact that most of the things that people read or take time to read do end up having an influence on them. Simply also because of the nature of reading. Of course, it does make a difference if you're sort of swallowing Harlequin Romances by the dozen or whether you're fighting your way through some boring textbooks or reading something that is perhaps more interesting or more meaningful or whether its fiction or non-fiction, I don't know, but I think in all of those cases, active reading is very important. That you learn and are developing your cognitive abilities. [F 315 – 322]

Ian addresses the power of reading in his experience when he expresses the idea that reading gives us access to minds that are potentially greater than our own:

> And, then in reading great literature, and my wife is a great point in that too because she studied literature at the University of XXXX [Name of a particular prominent American university], my God great place. And that literature showed me that there were great people thinking greater thoughts than I could ever imagine, and so that I really had to take that seriously. I couldn't just read a Jane Austin, just fly through it; I could see immediately I was under the influence of genius here. That I really

had to take account of almost everything I read. And literature can do that, absolutely. [I 198 – 205]

In Ian's comment, reading can be seen a stimulus to cognition through challenge since it is a conduit to the minds of other people. Similarly, Barbara groups reading with the other arts as a window through which we can glimpse how another's thought processes work and be challenged in our understanding of their work:

> I think it [reading] does, again, change and shift our thinking when we're – it's almost like living vicariously I think seeing someone else have this experience on the stage or on the screen or something. I think this makes us look at things in a different way. Hearing someone else read their work, so we understand why they wrote a poem that particular way. We hear their voice in our head when we read their work ourselves. It adds another dimension to it. [B 216 - 222]

Cathy comments on how reading can be undertaken as a deliberate attempt to change the nature of our thinking, in this case to move to thought that is "broader".

> I see it as a progression that keeps moving forward. I see getting broader. I've been looking at a lot of journals. I'm looking at a few journals that deal with generalized science, the history of science. [Name of conference omitted] was here I took the day off from work, and I attended the session on the history of the philosophy of science. That to me was really beneficial because it gave me a broader direction in my thinking. [C 835 – 840]

Reading as a challenge to cognitive development has been explored in recent studies. For example, Meyer and Talbot (1998) examine the interplay between reading processes and the ability of adults to use the information they acquire across the lifespan. As in other aspects of cognitive challenge, the more the capacity to extract information from text is utilized, the more the ability to extract information from text is maintained with advancing age.

Interacting with visual and auditory works of art is also a source of stimulus through challenge. Visual artwork, music and film impelled people to examine how they thought. Fiona comments on the interaction that occurs between a thoughtful viewer and a film:

> What I really think is fascinating is when you're watching *The Matrix*, what are you watching and why do you like it? And what is going on if it's providing something satisfying for you, and if it's not, where are the barriers? And, what can you learn about the way our society is working, and the way people work, the way that you work simply by watching a movie and talking about it. [Addendum - of course what I meant to say in the previous section was "function" and not "work" but it sounds so formal, I tried to avoid that.] [F 254 – 260]

Elaine finds access to another's person's thought process and challenge to her own thinking through viewing a sculpture:

> Well, one of the ways that you're studying, say, how an artist approaches his or her work, and I'm talking about art. One particular, she was a sculptor, she's an English sculptor, and she's about 40 now.

> She sculpts, she uses plaster casts, she uses the plaster cast of the *inside* of things. Like the *inside* of a closet. That sort of thing. I wondered why she did it, and I really had to think about it. Read again what she's saying about it. Whether you think that is, you know, earth shattering or whether you think it is rather strange, you still have to explain how that person is approaching his or her art. [E 387 – 394]

The challenge of certain hobbies was credited with energizing how we think. Stamp collecting, jazz music, interest in railways, framing prints and the game of bridge were all mentioned as tasks that place demands on your thinking structures when pursued to an expert level. Adam captures the breadth of possible influences associated with pastimes on cognitive development when he says, "There's a whole world out there besides your work life." [A 146] The challenges to cognition come from a wide range of possible topics and extend over varying periods of time. The ongoing interest in trains as an intellectual pursuit, mentioned by Ian, highlights how the effect of a stimulus can be sustained over time:

> I love railways – track and railway company. My grandfather, on my mother's side was a railway man, and he and I used to sit and watch the trains. This was in a town on the Mississippi, on a bridge that took trains from Chicago west, so there were a lot of trains. And, I became intellectually curious about railways and all the doings of trains, and there's no end to that. [I 219 – 222]

Involvement with a particular discipline, pastime, or hobby can all be seen as participation in activities. Stimulus as realized through challenge is closely connected to the engagement hypothesis in cognitive development literature since respondents

mentioned many activities associated with ongoing mental stimulation. Activity is generally connected with remaining mentally engaged (Salthouse, 1991; and Brandtstädter & Baltes-Götz, 1990). Brandtstädter & Baltes-Götz (1990) investigate the "actional nexus", which describes how activity is related to developmental outcomes. This study uses three waves of questionnaire data taken at four year intervals with people ranging in age from 30 to 59 years old to assess how a wide range of personal and social goals were mediated by the personal actions. Cognitive well-being was not a specific focus of this study, but the general goal of self-development was assessed. The authors assert that while individuals recognize there are many life factors beyond their control, belief in one's own ability to influence one's developmental prospects through action remain high even with advancing age (pp. 217 – 218). Engagement through travel, hobbies, pastimes, as the respondents discussed them can all be associated with remaining active to enhance cognitive development throughout the life course.

A majority of the participants saw conversation and friendly debate with provocative people to be an important challenge to how they think. Discourse was mentioned most often in connection with personal relationships that had reached a level of trust where discussants would confront each other's assumptions. Adam's comment is typical of many others that identified the benefits of lively conversation with friends.

> And so it's a stimulating thing, and we don't make the assumption that I've got all the right answers and you don't or vice versa and so you come away in one sense kind of drained and in another sense kind of

stimulated. If you say something, very likely you'll be challenged. But that causes you to clarify your own thinking process and some of your own thoughts. [A 76 – 81]

Barbara reflects on how friends can boost a person to greater depth of thought through discourse:

> Again, thinking about- most of my friends are older, it's just the way it turns out. And just thinking about, again, how they continue to try new things and explore and challenge, to question. I guess just watching their lives unfold. Knowing how they come back at me for anything that I say and push me, try to make me think about things in different ways. I guess that's where I was coming from on that – challenge. I don't have many friends who just kind of go along with things. They challenge, question and want to talk about, really talk about things. [B 96 –102]

Fiona saw great value in conversations associated with professional conferences as a challenge to how she thought. Interestingly, she was alone in crediting professional gatherings as a stimulus to cognition through challenge:

> People start talking and then you go out for a drink and you keep talking. You know, I've been very lucky being able to attend conferences. . . . the intense, paper-related discussions that I was referring to, where all of a sudden you're dealing at a far more high-powered, rarefied level than you ever would with any of your

colleagues. [F 294 – 295, 305 – 307, second half is explanatory note added by participant]

Ian commented on the importance of being associated with a person who was a source of challenge over time:

> I just cannot imagine the horror that men and women must face in being married to partners who aren't very bright. I have to say that my wife's always [over 50 years] been a challenge, but she's not such a playful challenge anymore. We have had terrible, terrible arguments that went on for a couple of years about the cutbacks that the Klein government was engaged in. Now, both of us are on the left. I would count myself a moderate socialist; I would say that my wife is further to the left than that. So, we both have a kind of core of agreement. But, she refused to think that the cutbacks were in any way justifiable, and that was a long, long argument that we had. Probably, as great an argument as we have ever had except for the argument we had early in our marriage about *Moby Dick*, which I thought was a terrible novel. [Laughter] My wife thought it was one of the great ones. [I 125 – 135]

On the point of having a provocative spouse, Schaie (1994) observes people living in close relationship with one another will motivate cognitive challenge for one another over time such that "the lower functioning spouse at the beginning of marriage tends to maintain or increase his or her level vis à vis the higher functioning spouse" (p. 310).

Sustained speech with provocative people is strongly present in the data grouped as stimulus through the property of challenge. In addition, many of the participants saw the educational environment as a context for challenge. Adam encapsulates the richness of this environment in these remarks:

> In the course of a day, you are exposed to so many ideas by so many people, some that you know, some that you don't know, some which are totally off the wall, and some which are very thoughtfully argued that I don't think there are any limits to it. And I think that if you have an open mind, and you think about all this input coming in, you will accept some, reject others, try some see if that works or not, try some ideas on friends, colleagues, students see if you get shot down or if they say, "Hey, what an insight". [A 168 – 175]

Gordon analyzes the opportunities for challenge through discourse that were present for him in the educational environment of post-secondary institutions:

> I found that one of the disappointments as graduates, becoming a faculty was that most of the intellectual stimulus came from undergraduates. As graduate students you shared the same fears, same problems, that constant exchange of information. Constant cutting your professors down when they weren't there. Particularly the incompetent ones. The intellectual give and take. Then I found once you got into the university, that the – that much of that ceased. Then the intellectual exchange came with students. You either made that or you didn't make

that. I found it much harder to generate that kind of thing. [G 227 – 234]

The importance of discourse was prominent in the comments of the respondents as a stimulus to cognition through challenge. Does discourse[2] influence changes in *how* we think? Jürgen Habermas's theory of communicative action suggests this is possible. Situated within Critical Theory, communicative action concerns itself with how reason is utilized in everyday language and how this utilization of language can shape change (Ramussen, 1995). Characteristics that typify communication at the rational level are the ability to make our meaning clear so that our assertions are understood, the ability to answer our critics, and the ability to be consistent in our messages and our behaviour (Warnke, 1995, pp. 124 – 125). Communicative action is tied to the process of argumentation through discourse, which Cooke (1994) calls "post-conventional" argumentation (p. 29). This type of argumentation has the power to challenge assumptions and promote transformative learning. Discourse includes an assessment of validity claims and has the potential to provide meaningful challenges to presuppositions (Mezirow, 1990). The respondents valued conversation that provided them with challenge to their opinions and assumptions; I believe this kind of conversation can be identified with the argumentation enacted in discourse.

The educational environment is itself a stimulus to cognition through challenge. Not everyone participates in higher education, and, as Fiona remarks, participation in education may suggest a willingness to engage in the stimulus of cognitive development:

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[2] The word "discourse" is used in this thesis to denote conversation that is a lengthy or in depth treatment of a subject.

> Once people actually make their decision to come into a classroom, I think that is the deciding line, and somehow once they're there then I imagine there will be certain openness. And I've certainly talked to people outside of classroom settings, and I've found that the ones who would not make the decision to take certain, especially . . .they wouldn't take courses designed to interact and improve themselves especially dealing with critical issues in society – I think once they actually decide to come into a class to participate in that, that says a lot about them right there. [F 59 – 66]

The action of teaching was also an element of challenge within the educational environment that stimulated cognition. Jake articulates an opinion, common among all respondents, about teaching as a source of challenge:

> Well, it's [teaching] brought me in contact with people who are trying to learn material and those students have different ages. Sometimes they're young. After a period of time, you begin to see certain streams of ideas, certain things that are true. Like the young ones are all fresh and bubbly and the older ones are a bit more serious and diligent. The whole process of teaching puts you in contact with people and if you're paying attention to those people, you'll start to observe things. [J 163 – 168]

Cathy expresses the link between teaching and learning that is at the root of teaching as a challenge to cognition:

> I continue to learn because I'm teaching, and although most of it is Adult Ed in teaching, I also tutor for [Name of post-secondary institution], so you have to keep to some degree with that as well. I learn from young students, and I learn from my adult students [this respondent uses the word adult to mean mature or older students]. Very, very interesting. [E 49 – 52]

Elaine, a woman with an amazing 50 years of teaching experience, comments on how each immediate teaching situation presents its own challenges:

> A lot of that was material that usually was accepted, as I said, readily, and this three-week course, I've never worked so hard for years. I had to figure ways to explain what some of these people were not going to want to accept the idea of. It wasn't that complex. It was just something that I could see that some of them did not want to entertain the thought of that much. I either had different fixed ways of approaching the subject or reviewing it or whatever. So, that was good for me too. [E 373 – 379]

Teaching as an activity challenging cognition has been explored in studies of teacher development. For example, Kwo (1994) suggests, based on the work of Fuller and Berliner, teachers' cognitive tasks change as they advance through stage models of professional development from being a novice teacher to being an expert teacher. Kwo also cites Kagan's work associating the shift from being a novice teacher to being an expert teacher with changes in metacognition, shifts in attention, and growth in problem solving skills (pp. 217 –218).

Gordon sees the post-secondary institution as not only influencing the cognitive development of those who work within it, but also expressed the idea that institutions have an obligation to expect people to engage in the challenges of the educational environment:

> Colleges are teaching institutes; we're learning institutions, and if a faculty member isn't learning at the university, he shouldn't be there. You're learning, as I said, your learning really begins to start, so there should be constant feedback between research in terms of your publications. That's what I particularly enjoy. And, you know, the feedback with students. [G 293 – 297]

These varied quotations all illustrate the property of challenge within the category of stimulus.

Inspiration for Growth

This property of stimulus is the influential people, the sudden brilliant ideas, however conveyed, and the new ideas that grip a person. The dimensional range of inspirations for growth extends from the past into the present since respondents gave examples of past inspirations that continue to inform their thinking and present inspirations that have a local effect at one specific point in their lives.

Inspiration for growth drawn from family members as mothers, fathers, siblings, grandparents, aunts, and uncles were all mentioned as sources that had made the respondents aware of the potential of human thought as we mature, and these people had inspired many respondents to consider the potential of their own thinking as they

themselves aged. Barbara captures the essence of this experience in her comments about family:

> I was always so inspired by the way my family members continued to learn and grow and question. Like I would be visiting some aunt in her seventies who was making me tea, and she'd say, "Have you ever experienced sexual harassment?" and I'd go, "What!?" – you know. (Laughter) She'd been watching a program or reading something, and it had come up and because I worked a utility company, she'd thought it might be something I had to deal with. Which of course it was, and so there'd we'd go, or another aunt and uncle would be reading everything they could get from the library on environmental issues and quizzing me on that. Or just that ongoing interest in things. And seeing my mother as well. She lived to be 87, and seeing her continually grow and change and become a feminist. Re-evaluate some of her religious ideas, you know, the Bible was the gospel truth, the word dictated by God, kind of thing, she would, in later years, in her 80s, reading books on how the Bible came to be and what God put in and what God left out. All of those things, and re-thinking her very basic, important, vital ways in which she saw the world. [B 57 –71]

Respondents saw inspiration as not just flowing from an older family member to younger family members, but also from the young to the old as in Harold's description of how his mother's thinking seemed to be influenced by the presence of her adult children attending university:

> My mother was a mature student, and I was at home at the time that she was. So, I saw her go through it. And, because she also had kids who were in university at that time, I think we really helped her in coming home in sort of the dinnertime discussions; everyone was sort of at the same place. [H 42 – 46]

Ian expresses a similar viewpoint about how family members can inspire each other's thinking, in this case commenting on a lasting source of mutual inspiration:

> My, I'm a mother's son, my mother was just an incredibly important subject of my attention, and she and I did the housework together. This was during the 1940s when she worked for the government. It was during the war. And I was doing the housework with her, and, in those days, you talked a lot as the two of you did things. And as I got more educated, knew more, I became as much an influence on her as she on me. And I got to see how she proceeded with that. [I 40 – 46]

The general value that a family places on education and learning was a source of inspiration mentioned by several of the respondents. Fiona comments on how family values form basic assumptions about the value of sustained learning in people's lives:

> I'm sure that there are certain influences from our parents and from our background and from discussions around the table when we were growing up and certain values with which we were inculcated very young that somehow – "This is what we value: get the most education that you can and pass that on". So, I'm quite sure that these are very

strong – that this was certainly a very strong influence in my life. [F 131 – 136]

Cathy's statements illustrate how the inspiration for growth that people draw from family continues over time; this acts as an ongoing stimulus. Many of the respondents commented on the pervasiveness of family values in the expectations they placed on stimulus to their own cognition.

> You know I wouldn't pigeonhole these influences but certainly they appear at different degrees, at different levels. Teachers – mentors – what did I say? [Consults survey form] I said profound. My mentors change. The mentors that stay the same are my parents, my parents are my mentors. I will never be like them, but I strive to reach, you know to reach that. It's not putting them up on a pedestal; it is that there are certain characteristics in each one of them that are important. [C 379 – 385]

Other people, but most notably, teachers, writers and elderly friends are also connected with stimulus for cognition through the property of inspiration. For example, Ian draws inspiration about his own cognitive future from elderly associates:

> I've known people almost a 100 years old, who are just as amazingly bright as tacks still, and I think what has happened with them is that they really have used their brains continually throughout life to the point where they just go from one success to another. And, I intend to do that myself, and as I say, if I can do it, anyone can do it. I really mean that. So, I think it's a good prospect, a good prospect.

> Unfortunately, my goodness, how can people reach their later years of life and just sit and watch television, or sit and not think. That's terrible, terrible. [I 402 – 409]

Schaie and Willis (1986) address the idea of efficacious education and found that cognitive decline is not irreversible and is often attributable to disuse. As Hultsch et al. (1999) state, "Essentially it is suggested that changes in activity pattern result in disuse and consequent atrophy of cognitive processes and skills. The view is often captured in the adage, 'use it or lose it' " (p. 245). This adage captures the general attitude of many respondents, who in agreement with Ian see the engagement of others as a good model for themselves.

The influence of people to inspire runs along the dimensional range from past to present; while some inspiration is very localized in its effect, other sources of inspiration have a more lasting effect. Adam comments on how inspiration can be drawn from a friend from the past:

> We would always meet for breakfast, and because of his breadth and background, he exposed me to so many things that being a little kid from the boonies, I would never have been exposed to. And he would encourage me to read, you know, some of the Roman philosophers and so forth, and just broaden my knowledge in a way that, otherwise, would not have happened. [A 44 – 49]

Stimulus as realized through inspiration highlights the importance people attached to close relationships with family, friends and other people. The respondents' comments contain many references to those individuals who have been exemplars of

possible cognitive futures and in general, these are exemplars of an active, optimistic cognitive potential in later life. This observation from the data has resonance with the idea in literature, which holds that a lifestyle favourable to cognitive growth or maintenance across the lifespan includes the presence of positive exemplars in a person's life (Schaie, 1994, 1996). In particular, maintaining intact families, including prolonged relationships with people who are not relations; and being married "to a spouse with high cognitive status" are antecedents to positive cognitive futures in old age (Schaie, 1994, p. 310). Dixon (1999b) has found evidence that "many older adults believe that they may benefit selectively from close collaborative relationships" (p. 286). Dixon's findings are evidence of belief in the efficacy of collaborative cognition, cognition set in the context of more than one individual.

These multiple respondent perspectives were illustrative of the property of inspiration within the category of stimulus.

Supports for Change

Supports for change is a property of the category of stimulus defined as help and corroboration *or* hindrance for conscious cognitive change. The dimensional range of this property extends from those things or people in the environment that discourage opportunities for cognitive stimulus to those things or people in the environment that encourage cognitive stimulus. Many people commented on the limitations on stimulus for cognitive change. Schwebel, Maher, and Fagley (1990) are among a group of theorists who have explored the social role in cognitive growth, which recognizes the interplay between the individual and the social environment in which that individual is situated. One aspect of the social environment is that it imposes

limits on the short-range growth possibilities of the lifespan cognitive development of an individual (Schwebel, et al., 1990, p. 5). An intuitive awareness of the limitations imposed by the social environment is illustrated in Adam, Elaine, Cathy and Donald's comments.

Adam's statements show a keen awareness of how supports for cognitive change are often dependent on life circumstances:

> So, the potential is great; it's almost limitless, but trying to be realistic, most people are married, there's things to do around the house, there's things to do with the spouse, with your children, things like shopping (laughter). Mundane things, and so there is a limit there on your time. Though I don't think it's terribly important for all people, there's a limit there money-wise. Each of us has an income, and at any point in time, there's a fixed amount. That does put limits on change [A 212-218].

Stress also hinders an individual's ability to benefit from stimulus to cognition. Elaine also notes the limiting effects of mental illness, " I had my mother who became very depressed and that's not as conducive to learning interest and so on" [E 99 - 100]. Cathy remarks on how ordinary stress and a busy life can present a limitation:

> My brother who is a medical doctor is that he is unable through his discipline to really keep up in his field. He attempts to keep up in his field, he goes to conferences, and he goes to workshops, and that's very important. But, I find that his attempt to continue learning is more

difficult because he is very busy in his job. His job comes first. [C 218 – 222]

Donald is able to articulate an overview of life's concerns as distractions from considering one's own cognitive potential:

> Let's start with those early years, you come in; you're confused. There's all of these things around you – boyfriend, girlfriend, the relationship with your parents, what do you want out of life, what is the meaning of life, what do I want out of school, I haven't decided on my career, am I going in this direction or that direction. And they're all like equivalent, kind of pushing and pulling all at the same time. I have a lot of students, young students who have personal problems. They don't come to class – Why? - Well, I'm having personal problems. And then that kind of sorts itself out over the next four years. Then, you know, by 21, 22, let's get serious, what is my career going to be, do I want to get out of school as quickly as possible and do real work or do I have bigger ambitions, be a professional, go to graduate school or get a higher degree – they're sorting all of that out. Then I think what happens is by the late 20s, you're starting to say have I achieved what I what I wanted to do. That's when you start worrying. That's when people return to school because they don't want to be a clerk in Sears for the rest of their life or what have you. They do want to achieve some of these ambitions that have now satisfied them. I think, by the late 30s, you've got it sorted out – what you want and are you happy

> with what you've got. Then I would say through the 40s and 50s you're parents up your kids; that's more your focus. You're going to work. Either you're a go-getter and you want these ten thousand promotions as a CEO or not. You've sorted that out; family becomes more important, community involvement or whatever, you know, just trying to wind down. As you approach retirement, you kind of go, "Hey, work's finished, now what do I do?" [D 337 – 359]

Other comments indicate an awareness of how factors internal to the individual can limit cognitive development. Barbara notes the limitations imposed by a person's self concept, "Self-esteem is still a major, major issue for many people, women particularly. And so that's come up quite often [in classes of older learners]" [B 334 – 336], and also the possibility of deteriorating cognition due to physiological decline, "I was thinking of extended family because I grew up in a rural area where I was surrounded by aunts and uncles, grandparents too for a while. Now, Alzheimer's runs in my family so that has affected some of my relatives in their later, later years, but otherwise" [B 56 – 57].

The above comments all represent an appreciation for the natural limitations on the benefit that can be derived from the phenomenon of stimulus to cognitive change.

Many of the respondents perceived a person's later years as a time when people could pursue cognitive stimulus unencumbered by other demands. Elaine describes how her older children became a support for her cognitive needs when she no longer had to invest her time in meeting their needs:

> Well, I think as an older person [going to school], as far as I'm concerned - my children were in their late teens, early twenties and developing lives of their own lives and I felt I had their encouragement. And I felt, to a certain extent, their pride in me that I was carrying along, that sort of thing. But, I didn't depend on their, I don't think I did, I didn't depend on their encouragement or whatever. I know it was there, let's put it this way. But, I wasn't depending on it, really. I appreciated it, let's put it this way. [E 73 – 79]

Others also mention the emotional support that was provided by family and friends when they were facing events in their lives that caused perceived changes in how they think. Barbara shares a personal experience that illustrates this point:

> One of the things, for example, that I've seen with one friend is where she has a very, two friends actually, in their fifties that have very strong value systems that include – fidelity in marriage. I ended up being unfaithful in my marriage, and in the one case, she said directly to me, "You know I don't approve of what you did, but you are my friend. You will always be my friend, and so we will take it from there." But I really appreciated that she was able to be so direct with me about how she felt about my actions, and where she stood in terms of her thinking, yet still extend to me that acceptance. You know, unconditional support. [B 108 – 116]

Just knowing there were people interested and supportive of their attempts at cognitive engagement seems to have made a difference to some respondents. The importance of

supportive people has resonance with the familiar educational debate about nature versus nurture and draws our attention to nurture as a lifelong concern in cognitive development. In their discussion of how adult cognition precedes, Fisher and Kenny (1986) state, "The environment plays an important role in supporting not only the construction of skills but also their use after they have been constructed" (p. 75). Respondent beliefs were sensitive to the effects of environment on cognition.

Supports helpful to an individual's deliberate attempts at engaged cognition include not only the ameliorating presence of family and close friends, but also the presence of constructive institutional features within education. Of great interest in this study were the many remarks about how the educational environment can hinder or help the cognitive opportunities available to people who work within it. The cognitive challenge accessible to young students was perceived by many to be limited by the training they had received in high school. High school and standardized testing was perceived by three of the respondents as a hindrance (lack of support) for stimulus to cognitive development. Cathy's comments are illustrative of a general uneasiness about the response of young students to cognitive challenge:

> So, I don't know if that [lack of critical awareness] is related to their experience of coming out of a high school system, which really forces standardized information, and maybe lack of creativity [C 94 –96].

Donald also comments on how supports of change within stimulus to cognitive development seem to have been absent from the experience of young undergraduate students:

> Immaturity of thought. You get the whole gamut. So, there are some [assignments] that are defective because the effort has just not been put into it. The effort has not been put into it because "I've been a good student all through all my years in high school, why shouldn't I automatically be a good student now?" You have to tell people that you have to abstract; you have to ask why, question why something has happened. [D 295 – 300]

Many theorist attribute immaturity of thought on the part of undergraduate students not to lack of cognitive development, but to the phenomenon that undergraduate student in North American are unprepared (Levine, 1999 and Green & Dorn, 1999). In fact, Green and Dorn (1999) review the literature on this concern and conclude that aptitude has not declined over the century, but students are nonetheless unprepared because they are first generation students who do not come from a family tradition of participation in academic education (p. 63).

Ian sees the pressure on people to receive certification; this is also indicative of a pressure in the educational environment that distracts people from pursuing cognitive challenges:

> Now then, so far, I taught evening credit and extension, and there I was in a program in which men and women in their 40s and 50s, who wanted a certificate because they required that, were there. And, that was a disappointment in many ways because there were people who were there just to get the certificate, and they were not interested in

learning anything. On the other hand, it was in the evening, and they'd had full days. [I 314 – 319]

Elaine sees societal attitudes toward learning as shaping whether people seek out cognitive challenges from a sense of intrinsic motivation:

> I don't – I think that I don't know sort of the attitude, the public's attitude toward, say, learning that has no consequences say exams or whatever. I think it's becoming, shall we say, a more accepting attitude by the public. At least, the public of people my age, middle aged to older years. I'm not sure if the young – [pause] the young do accept, the learning or expertise of an older person if it is something that they are interested in learning, can relate to. That is something that I find really very interesting in that there used to be more acceptance, awareness of teaching, learning with not perhaps, as I say, any reward at the end except your own satisfaction and your own enjoyment, if you will. [E 412 – 420]

Cathy echoes Elaine's thought about the acceptance of older learners in education, and this ties the support for change within the stimulus for cognitive development to a societal value system.

> I think too it [opportunities as we age] probably depends on how society is perceived. I think universities and colleges play a really important role by setting up seniors programs and older adult programs and giving people the opportunity to do these things. [C 1052 – 1055]

The pressure on institutions to respond to societal attitudes and provide programming supportive of the cognitive goals of older learners is present in the literature. For example, the British authors Schuller and Bostyn (1993) note demographic shifts to greater number of older students will force institutions to respond to the rising educational expectations of these students (pp. 373).

Two of the most experienced respondents, who linked their duties as faculty with their opportunities to engage in cognitive challenge, noted how their institutions had supported that access. First, Elaine comments on how her post-secondary institutions have supported her:

> I've taught until I was 69, and I've been grateful that I was given the chance to. I told them when I was about 63, and through my boss at XXXX [name of a particular post-secondary institution], who kind of paved the way for me, they said as long as they were happy with me and I was happy with them, that was fine. Because I was not full time. It was nice of them to do it that way. No, I have no classes that I'm teaching, that I'm facing, shall we say. [E 299 – 303]

Second, Gordon sees mandatory retirement as having an important, hindering effect on the support for a stimulus for an individual's cognitive development:

> I think my father's; my father was a very intelligent man. He had to drop out of high school to put his brothers and sisters through school. The worst thing with him- he really enjoyed work. Talk about the Protestant ethic, he really had it. And when he became 65 and retired, it really shocked him. He just couldn't believe it, and he once a year

would go over – he worked for what would be the equivalent here of the CMA, Canadian Motor Association; in California, the Automobile Club of Southern California. He'd go over for two weeks a year and work for them issuing licences. And it was the high point in his career. And I always was convinced that retirement almost killed him. Then my mother became very ill, so he became – he took care of her. Ended up dying ten years ahead of her. I thought, "Oh, no, no, no, no, no, I'm not going to let this happen." Certainly that aspect of it. I – my biggest disappointment was like his; I thought there was going to be no mandatory retirement. Mandatory retirement here; I've never quite forgiven the university for that. [G 120 – 133]

On the issue of mandatory retirement, the numbers of older faculty members in higher education are currently growing (Mauch, 1990). Graham (1998) found that a favourable "educational ethos" supports the cognitive growth of both staff and faculty. Elements of this ethos include connections between learning, out-of-class experiences, and personal development (p.249). Clearly, a person forced into retirement would no longer have access to this supportive ethos. Elaine and Gordon's remarks, among others, show that supports for stimulus for cognitive development can be traced to institutional features.

The broader context of faculty access to work was also linked to support for stimulus for cognition since in times of job scarcity people are forced to be more reflective about their work and their careers. Cathy is alone in expressing a link

between available jobs and how her thinking has been challenged; she sees market forces within education supporting the way she engages in thinking about education:

> If you were holding this interview four or five years ago, it would be different. A different perspective for me. I wouldn't really know where I was going with age groups that were either sort of in early 20s and if you had the interview ten years from now, I think that I wouldn't be as critical as I am. So, I think a lot of it has to do with the job market. The job market, in a sense, is forcing me to self-criticize my teaching as well. And, I think that's very valuable, very important. [C 554 – 560]

In summary, the respondent perspectives linked to the category of stimulus encapsulate how effortful cognition is challenged, inspired and supported through a wide range of personal interactions, deliberate actions, uncontrolled life circumstances, life decisions, institutional policies, and societal values.

Clues

The second category, clues, is identified as those factors that illuminate an individual's understanding of the cognitive changes that occur in others and one's self. These suggest how others think. The category of clues includes the properties of observations, comparisons, and self-reflection.

Observations

This property of clues is those things learned by watching, perceived of others, and notice taken of something outside the self. The dimensional range encompassed by observations extends from sensory to intuitive perceptions. The people who were

noticed by the participants in this study in regard to understanding how others think were those who were in some way on intimate terms with the participants. Several of the respondents observed and commented on the way women preceded intellectually as they aged. There was recognition, from four of the respondents, that gender has an affect on thinking. For example, Ian comments on a quality that he perceives as being specific to women:

> I've always thought of them [women], in many respects, as having a very different side of humanity. And, to have those older women there who know about men, and children, and all of that in their special way has always been a matter of interest. The only thing there is about them is that you have to draw them out because they may not say anything. But, that's easy, to draw them out, I'm an easy provoker of people. I love that; I love it. [I 331 – 336]

Women are also observed to be more likely to engage in learning and seeking out new challenges as they age, as Elaine comments:

> I was just talking to one of my friends this morning. She just does everything, and you know, she's just so interested. And he, since he retired which is now about 12,13 years ago has not really started to try to do anything new. Of course, he's getting bored. [Laughter] [E 187 – 190]

Her observation is supported by Donald's statements about the predominance of women in academic programs aimed at senior learners:

> I find, I think that women are much more comfortable because they've never retired, although more of them now have jobs, but many of the women I've met have been full time wives or what have you or their career has been secondary to their husband's, like they had one but they could afford to give it up. It's not as important. So, they keep on trucking, keep on trucking, kids have left home, I'm here in this house, well let's do something, and they go on these tours and trips, to XXXX, XXXX [names of programs offering university level courses to senior students]. They're just performing well. The men, you know, they are like that. I think men are like that – it is more difficult for the male ego. And, rather than go out – I have a lot of good male students, very interesting, there's no difference, but a lot of women that I would presume are widows, the husband doesn't want to come. Prefers putzing in the garage or in the house, garden or whatever like this. So, women seem to be interested intellectually, you know. [D 368 - 381]

The theories of Belenky, Clinchy, Goldberger, and Tarule's Women's Ways of Knowing and Gilligan's Theory of Women's Moral Development both raise the issue of whether gender plays a role in cognitive development (Evans, Forney, & Guido-DiBrito, 1998). Though respondents were not asked directly whether they saw a difference in women's thinking as compared to men's thinking, two respondents did mention that they found older women in their classes to respond differently to material than did the older men in their classes. One respondent commented that older women in a particular class were more critical of non-traditional ideas in art [E 265 – 269],

and Ian connected women's knowledge to family. I suggest the last comment might be connected to Belenky et al.'s (1986) ideas about received and constructed knowledge and their concern for transmission of knowledge between people. Gilligan's (1982) theory is concerned with care and connection, and this has resonance with the many comments respondents made about people they knew well. The importance of social process implied by this type of response is explored more thoroughly in relation to the findings of axial coding. In connection to differences in gender participation in education, six of the respondents noted that women had a far higher rate of participation in academic programs aimed at older learners than did men. This general trend is easily observed since males make up 33% of older learners and women make up 67% of the total for continuing education programs serving older learners in North America (Lamdin, 1997, p. 67). How the predominance of older women in such programs shapes instructor attitudes is a question that warrants investigation in a further study.

Observations culled from the comments of the respondents also cover the respect participants hold for non-academic forms of intelligence, the persistence of personality traits as a person matures, the importance of prolonged experience as a factor in cognitive development, the possibility that cognitive futures as we age may be marked by regression, and the idea that cognition is unchanged as we age. Ian's statements are a good example of the observation that cognitive development can be described in terms of intellectual curiosity rather than academic success:

> That's interesting because now one of my best friends is a black Jamaican building superintendent, and I just flowed right into that

relationship because I'd worked with those people. I think he may be, this Jamaican, I think he may be the brightest man on this campus. Uneducated, but just as bright as he can be; my goodness, he's quick, you know. [I 283 – 287]

Similarly, Gordon observes that cognitive potential is not always tied to academic achievement:

> One or two in the park service, I guess, but I didn't think of it – I came at them in a point in time. There were two individuals; both of them were near retirement. And I never thought of them as ever having been any different or going to get any different. I don't think they did get any different. One was non-literate; he was a packer. Taught me how to pack saddle horses. He had a terrific knowledge of plant and animal life. He knew every plant that grew everywhere and how the animals did or didn't feed on it. Yet, he was, as I say, he had no formal education. Another one was a chief ranger; he was as tough as nails. But he was a very impressive individual. [G 336 – 344]

The observation that the potential of human thought is not mediated solely by our conceptions of academic intelligence has resonance with many of the theories of cognitive intelligence, but this observation is especially pertinent to the ideas of practical intelligence (Sternberg, 1999) and the conception of associating wisdom with expertise (Sternberg, 2000).

Fiona observes that personality types cut across age groups and complicates our ability to notice whether thinking changes with age:

> I think in terms of group dynamics, of course, you generally tend whether you have young or older ages, you have certain personality types. Group dynamics that are happening where certain people are more aloof and other ones tend to speak out more freely, absolutely. Of course, what they say (Laughter). The reasons maybe they're doing this tend to change with age. [F 69 – 76]

Personality is identified by Hultsch, Hertzog, Dixon, and Small (1998) as one of a number of factors that may exacerbate or ameliorate various complex cognitive outcomes (p. 50)

Jake notices that for some cognitively demanding tasks prolonged experience with that activity seems to enhance a person's thinking process:

> When you're trying to play bridge, there's a lot of thinking. What I have observed is there are some people who on first impression might look a little bit simple or less than all there, but you get in a bridge game with them and they're as keen an as alert as anybody. And so what you see with some of these people is just an amazing ability to process information, that is far above average and yet sometimes these people are in their 70s and 80s and they're just all there. They're really capable of dealing with this and what you see – years and years of practice and assimilation and pulling together of bits and pieces over a period of time and getting to the point where they can do mental feats that most other people would just find impossible. [J 117 - 126]

This comment also acknowledges an idea present in literature since expertise when defined as a growing body of specialized knowledge acquired through prolonged experience over time, can be identified with wisdom (Dixon, 2000, p. 32).

Some observations were based directly on those things participants could discern through their senses while others were intuitive and involved an imaginative leap to understand the internal intellectual life of another.

Comparisons

The estimates of similarity between groups of differently aged students comprise the next property of clues. The dimensional range of comparisons extends from those very few isolated comments that hinted cognitive development was the same across age groups to those who indicated that cognitive development was different across age groups. The comparisons offered by this group of respondents suggest that older students are more engaged in their learning, more likely to hold definite opinions, more likely to have a critical stance to coursework, and more able to place their learning within a context. The young were seen to have different motivations, to be more tolerant, and to be primarily concerned with mastering factual information. All these comparisons affected the respondents' understanding of how cognition changes over the lifespan, and since respondents were chosen on the basis of their experience with differently aged students, they had many encounters upon which to base their assessment.

In relation to comparisons that indicate similarity, Gordon notes that young and old students are the same in that there are bright ones within each group:

> That's [distinguishing between groups of students based on age] a little difficult because some of your younger, you know might be the brightest ones, will write something that you couldn't distinguish from some of the older, brighter ones. I think a lot of it has to do with not just intelligence, but the personality of students. [G 462 – 465]

Nearly all the data associated with the category of clues as bounded by the property of comparisons is concerned with the many differences these respondents saw between different age groups of students. All eleven respondents found areas of thinking for which they considered their older students to be at least as able as their younger students. The greater engagement in learning exhibited by older learners in comparison to younger learners is noted in Elaine's comparison of the two groups.

> Well, actually I found that on the whole, those who are old have really wanted to be there, and they have better studying habits. They are more focussed, not all of them entirely, but, on the whole, I did. The same as the ones I'm tutoring. One of my very best students was a woman who would be probably in her 50s. [E 202 – 205]

The greater propensity of older students to hold strong opinions as compared to younger students is suggested by Adam's remarks:

> If I were to ask the question, "What do you think of Ralph Klein's government?", the younger students would either say, "Oh, he's great" or "Oh, he's terrible" and not really know why. The older students would be split good or bad, but they would have specific reasons why. And they would have a lot more fact to back up their position. If you

> asked the younger students they would all say, "Oh, my dad voted for him, he must be good" or "My dad hates him, and therefore he's no good" or whatever (laughter). The younger students haven't really thought about it themselves. [A 376 - 383]

Donald conveys the critical stance that is more often exhibited by older students than by younger students:

> The seniors – they question – can you tell more about this point of detail? Or whatever. Run of the mill. I'm doing this course on [name of specific course omitted] – How does that work? You know, how exactly does that work? There, they've caught me out once or twice. The person is just thinking, trying to make sense of it and doing a very good job. I have a good rapport with my students. With undergraduates, the critical part is – you're demanding too much from us. [D 148 – 153]

The idea that older students are more likely than younger students to be able to place their learning within a context is illustrated by Fiona's comments:

> The seniors in this class have a great deal of self-confidence. They speak with [authority] – some of them- I mean it's also a wonderful group in that they are so educated, and in that they are so knowledgeable. So, they speak on the basis of that knowledge. This is something you don't find in an undergraduate class where they have nothing to draw on. [F 546 – 550]

The respondents also made comments about the intellectual abilities of the young in comparison to mature and older students. It was noted that the young have markedly different motivations for engaging in learning than do mature or older students. For example, Barbara says:

> Again, a real shift in perception, and I would say that's the difference, even within a public relations class where some of the students might be 20, some of them might be in their 40s, the ones in the early 20s are still niggling over every mark, and they'll come to you, "Well, why did you give me this, why did you give me that? I wanted this mark, and you gave me that mark, and de da de da de da" The older students, they have children, they have husbands, they have jobs, they have other things going on in their life, maybe elderly parents they're trying to deal with. Marks aren't important; they have a different sense of what counts in life. They want to pass, yes, and they'll do their best, they'll drag themselves out of their sickbed to get a paper to you on time, but they aren't picky about a point here or there. [B 290 –300]

Adam, among others, saw the young students as being more tolerant than the older students. This is a remark that corresponds to the idea that the older population of students are opinionated.

> Yeah, young people are more tolerant of the racial ethnic diversity in Canada. That's a very definite difference. Most XXXX [program for seniors] students are, for lack of a better term, white Anglo Saxon Protestants, and if you point out to them that 10% of Edmonton's

population is Chinese, "Oo, boy that's not good". (Laughter) "We're letting in all those foreigners." Then I'll say, "Well, you're talking about me; I'm an immigrant." "Oh, we don't mean you." You know, but it's no different at the university. Walk the halls there, you see people of different races holding hands and dating and so forth – it's nothing unusual. And then nothing is made of it. There is a very definite difference by age group. [A 404 – 412]

Younger students were perceived by eight of the respondents to be more concerned than mature students with mastering only factual course content, as Cathy notes:

So, bottom line, younger kids are, I think, much more fact-oriented. That's my perception. I think that they're much more oriented on the here and the now. Do it now, I need it now, I need a good grade now to get into the university transfer. Whereas, I think the older community has been to places. I think that they've got a broader base of understanding. Oh! I'll give you a good example, actually. One of my older students, he's 39, 40 from this class. At the beginning, he asked me very difficult questions, and then half way through the course or three quarters way through the course he said, "I've now got it. I now really enjoy this, and I now can really see where this is going. I've started to read all sorts of things I would never have looked at." And it fit, he told me that it fitted and he was putting it into his philosophy of life. I thought that this was wonderful. Instead of doing it for a mark or a grade, he actually saw an application. Maybe I'm being too

general, but I think that's a fair assessment of older students. I think their perspective is different. [C 109 – 123]

The comparisons of older students to younger students volunteered by the respondents in this study correspond to the findings of Bishop-Clark and Lynch (1995) who studied faculty attitudes to mixed-age classrooms. These researchers investigated faculty attitudes on a large number of factors, and in part, their findings indicate older students to be harder working, more apt to hold and express opinions, and more interested in learning for learning sake (pp. 756 – 777). Unlike this study, the Bishop-Clark and Lynch study does not attempt to distinguish between young, mature and older students, nor do they link their findings to cognitive development theories. Donaldson, Graham, Kasworm, and Dirkx (1999) draw on past research of others to connect student characteristics to cognition theory and to point out that mature students draw on prior experiences, self-understanding, and complex metacognitive strategies in their more serious approach to education (p. 6).

On a note more flattering to the young, Elaine expresses the idea that younger students are more willing to take creative risks than are older students:

> Sometimes, I'm quite impressed with young, good students, and the creative way that they approach a problem. Whereas, perhaps, the older ones – it's a bit more – I can see it because I've done it myself – it's a bit more traditional type of approach. You still get there, but your younger ones sometimes aren't afraid to be just a bit more creative. [E 247 – 253]

Luszez and Fitzgerald demonstrated that adults have more knowledge about the development process and more positive attitudes towards the old when they are in regular contact with the old (as cited in a Blanchard-Fields, 1996, p. 474). The respondents in this study seem to have a great respect for the abilities of older students, and this respect may be attributable to their contact with these people.

In general, within the property of comparison as a clue to cognitive development, the instructor respondents had a more positive respect for the abilities of their older students than for either their mature students or their young students.

Self-Reflection

This property of clues is statements based on meditation with oneself about one's own experience. The dimensions of surface reflection and critical reflection bound this property. The two principal views emerging from this category are first, being aware of ourselves in our professional role can help us to understand the thinking of others, and second, self-reflection about our cognition is also a clue to understanding development. For example, Jake articulates the importance of self-reflection to understanding the cognition of others:

> When you start looking, if you're paying attention, you might start to see that the older students don't always do as well on some level and then you start to think, well, what could the reason be? That's a natural thing, I'm an inquisitive person, I like to come up with reasons for

things if I can. How is it that older students still perform on average, pretty well? And so, you ask, why? [J 151 – 155]

Adam's comments illuminate how reflecting on one's own cognition can also be a source of information about the course of cognitive development in adulthood:

> Well, I believe I am making progress. I know more now and I know why, more than a year ago. But there's always a sense of dissatisfaction that I didn't learn more or gee, there's a whole field I really should know something about and I don't [A 226 – 229].

The dimensional range of this property can be recognized as extending from surface reflection to critical reflection, but it may be difficult even for the respondents themselves to judge whether a reflective statement can be definitely placed at one end of the dimension or the other.

Respondents in this study certainly saw a link between critical self-reflection and changes in how they think and have thought over their lifespan. The respondents' comments about the importance of self-reflection as a way of understanding cognitive development can be associated with metacognition, or thinking about thinking. Hertzog and Dixon (1994) point out that the place of metacognition is closely related to memory, language production, and problem solving. Some theorists conceptualize beliefs to be part of the stored information that is held in permanent, long-term memory (pp. 228 – 229). When I ask respondents to reflect on their beliefs about adult cognitive development, I am placing a demand on their declarative knowledge, their awareness of the current state of their own memory, and on their self-referent

beliefs about their own thinking. From a psychometric perspective, I suggest these three demands describe the cognitive work that is undertaken when people are self-reflective about their beliefs. Demands placed on declarative knowledge, memory and self-referent beliefs can be interpreted as a challenge to cognition.

Using ideas associated with metacognition is one way in which we can explain how critical self-reflection can change how we think; additionally, a second way to examine the role of critical self-reflection in changing how we think is to consider transformative learning theory. Transformative learning explores those moments in people's lives when they are pushed beyond the ordinary habits and limitations of their conscious selves. As one respondent wrote in connection with identifying factors that have shaped his beliefs about the cognitive potential of adults, " ... I want to stress my active church life of many years, and of course, I reflect upon myself" [I 429 – 430]. This comment hints at the power of the trans-rational to shape how we think, and it identifies the importance of self-reflection The importance of self-reflection as a challenge to how people think can, in my opinion, be linked to research on transformative learning both from the primarily rational conception of perspective transformation (Boyd & Meyers, 1988; Mezirow, 1990) and from the pre-rational and trans-rational viewpoint in which heart, soul and spirituality are seen as the agents that effect change in how we view the world (Dirkx, 1997, 1998, Palmer, 1998, Sardello, 1992). Both these perspectives value self-direction, self-knowledge and critical self-reflection as means of effecting change. Sinnot (1996) emphasizes that the developmental perspective of cognition is inclusive of emotion and life meaning (p. 358), so transformative learning theory as a proponent of critical self – reflection as

a means of changing how we think has a place, I believe, in a consideration of cognitive development.

In summary, the second category, clues, includes the properties of observations, comparisons, and self-reflection. All three properties suggest how others think.

Reactions

The third category is conduct within teaching. The category of reactions includes the properties of disposition, practices, and preference. This conceptual framework produced by open coding is once again used as a frame for respondent comments.

Disposition

This property of reactions is the personal way of regarding the cognitive nature of others, including expectations and disproved assumptions. The dimensional range of this property extends from pessimistic to optimistic expressions although it should be noted that while comments vary in their degree of optimism, they are all somewhat hopeful. Adam captures a commonly held disposition with these words, "So, there is an assumption in my method that these are thinking people [students of any age]. That they can think, that they can make up their own minds." [A 280 – 281] Stereotypes about older people in general and older students in particular were overturned by contact with older people, as Donald says:

> So, when I was thinking of cognitive development or teaching or whatever because of family. My wife worked with seniors. She was the manager or a lodge, and she was in the social work sector for down and out people. The type of seniors I got were not the type of seniors

she got. But, we talked about seniors, and, you know, I'd go meet her at work. You meet them. The first thing is when – let's see I've been teaching 3 ½ years – when I started teaching it was – Well, who are these type of people? Do I have to dumb it down? What can they absorb and what can't they absorb? What have you. And, because of the work my wife was doing, I realized that they remain active, they want to be active, they can be just as sharp as anyone else. [D 31 – 40].

Previously held assumptions about the intellectual life of older people were disproved by engagement with older learners. Barbara provides an example of this:

> They haven't figured it out, they haven't solved anything, they are still working at it, and that's something that, for some reason, came as a surprise to me. I thought they, by the time they were seniors, they would have it all figured out. (Laughter). [B 331 – 334]

In agreement with the studies reported by Hess and Blanchard-Fields (1996) and the specific findings of Hummert (1990) or Kite and Johnson (1988), the respondents in this study did not connect negative stereotypes with the old, and in general, none of the respondents held more negative stereotypes of the old than they did of the young. On the contrary, the respondents found their younger students to be lazier, less interested in learning, and less responsible for their own learning than were their mature and older students. It is possible to glean a connection between the respondents' experience with mature and older students and their respect for the potential form cognitive growth across most of the life course, so I think it is fair to

state these respondents do not share the mistaken assumption, identified by Willis and Schaie (1999), that cognitive abilities peak in young adulthood.

Ian captures the sense of pessimism that can characterize a teacher's disposition in regard to younger students:

> Well, I've worked from the youngest to the oldest, and with the young students, it was always kind of a mystery to me – you have to remember how I was raised – it was always a kind of mystery to me why some of them would just sit there and not learn. And, after a while, I took the kind of ill-liberal stand of forgetting about them and teaching only those who wanted to learn. That bothered me and bothers me morally that I did that. On the other hand, I don't know. I learned then the disappointing fact that there were people not interested in learning even though they were in a university of all things. [I 297 – 304]

Barbara is a good example of the positive disposition all of the respondents developed towards senior learners:

> She [older student] said she had lots to learn, but she made an interesting comment, she said, "I just want to be able to read all the books in the world before I die". And that's, that's the attitude that I see so often in the seniors that I work with. And I find that so exciting. (Laughter) [B 42- 45]

Overall, a positive disposition toward mature and older students was an element of respondent reactions within teaching.

Practices

This property of reactions is action in the classroom and other educational environments. The dimensional range that describes this property extends from practices that are unresponsive to students to practices that are responsive to students. For example, Donald would fall at the unresponsive end of the dimension as he uses the same practices with minor alterations depending on the age group:

> Straight lecture style, and what I try to do is emphasis themes, significance of what is happened, causes, consequences. All my exams are name the two causes of this, describe – you know – explain the cause and consequence and so forth. Students have a tough time with that, for sure. But what is nice is that I don't have to change it for my seniors. Because I have clear themes, you know, and what I do with the seniors is tell it a little bit more in terms of a narrative or a story. And use little illustrations to kind of jazz it up. Personal what happened to so and so, a cute little story or whatever. That kind of livens things up. And, for undergrads, you don't have the time. I try once in a while when things get bogged down. The students go, "Why are you telling me this? I wanted to know the facts, the most important points. If this is not important, I don't want to hear about it." [D 102 – 113]

Not altering your coursework and approach could be seen as a sign of respect for the abilities of different age groups, so the term "unresponsive" need not always have a

negative connotation. In contrast, other instructors were responsive in their teaching approach. Adam structures courses differently based on the age of the students:

> The [specific name of program for seniors] courses are less structured, more self-guiding in the sense of the Middle Eastern course that I just started. First day, "Well what countries are you most interested in?" And I take a survey, "How many of you have been to the Middle East, which countries have you been to?" So we can try and relate it more to their demands, their interests. Where in an academic course, you know as a teacher, you've got to teach micro-economic theory, and there's going to be an exam at the end, and you want to make sure that you cover all that you're supposed to cover. And so forth, because they're going to get tested, and at some point, in the real world, they're going to get compared with students from other teachers. So, there's less flexibility in that sense. Now a lot of that is self-imposed by me. [A 288 – 299]

Long (1993) reviews dissertation abstracts on self-directed learning written between 1966 and 1991 to uncover "elderly-specific" research and discovers Brockett, Diaz, East, and Sears had all completed doctoral work establishing a positive correlation between self-directed learning and the life satisfaction of elderly people (p. 2). Adam may be reacting to this preference when he makes his courses for seniors more self-guiding than those for traditional classes.

Barbara tailors her practice to fit the specific qualities she has observed in the age group she is teaching:

> I tend to bring in, to work very deliberately at triggering memory, so I bring in objects, different physical, tangible, objects to trigger memory. So that, when they're holding this chamber pot, "Oh, yes, I remember" or this lantern or looking at this seed catalogue, whatever. So that, I use a lot of props when I'm teaching seniors. Whereas with younger groups, I'm more apt to read them a passage or not do as much sort of hands on. [B 386 – 392]

Barbara and Donald's tactic of working with reminiscence and narrative with older learners is a teaching strategy often advocated for older learners (Kaminsky, 1984, for example), and Barbara is correct retrieval of memories can be triggered with familiar objects and conversation (Hultsch, Hertzog, Dixon, and Small, 1998, pp. 150 – 152). Fiona notes that with a class predominated by older students it is necessary to accommodate specific needs:

> Well, of course, the problem in the first couple of classes where I had to make quite an adjustment in my teaching was simply physical. I was – and they were very nice about it, but I don't necessarily have the loudest voice in the world. And, they really needed me to slow down and repeat everything because half of the class is hard of hearing. And, one gentleman; actually, I saw him today, he was – he simply didn't come back because he was – he needs a new hearing aide. In some classes, if it's just one person, a large male preferably standing at the front of the classroom speaking in some kind of booming voice, then he's fine. But, once there's discussion and things, he couldn't follow.

That was one thing I wasn't expecting. I guess I wasn't thinking, "Okay, we have to deal with infirmities." Now there's another little old lady. She's really sweet, but she's got her roller and stuff. She comes in, and I'm always worried she's going to – she seems so frail and everything. That required a little bit of a change, but it's certainly not a problem. And, they're very nice about things they don't understand. They say, "Could you repeat that. You know, I've got to turn this thing up a little bit." (Laughter) [F 528 – 543]

Responsiveness to sensory declines was the one cognitive decrement that shaped the teaching practice of these respondents. In regard to all decrements associated with adult cognitive development, the points of intersection between respondent data and the review of literature are on the topics of attention, sensory declines with age, and the findings of the Seattle Longitudinal Study. None of the eleven respondents made any specific comment about the universal decline in cognitive functioning that precedes death, terminal drop (Rybash, Roodin, & Hoyer, 1995; Schaie & Willis, 1991; White & Cunningham, 1988). Comments or observations that could be related to the universal effect of slowed processing in which the cognitive function of older adults appears to be slower on many tasks (Dixon, 2000; Fry, 1992; Hess & Blanchard-Fields, 1996; Park, 1999; Rybash et al., 1995; and Salthouse, 1991, 1996) were not mentioned by any of the respondents. The decrement of decreased attention (Ashcraft, 1998; Fry, 1992; Rogers, 2000; and Rybash et al., 1995) can be connected to the observation, made by two respondents that older students would occasionally fall asleep in their classes; however, these respondents did not specifically connect

sleepiness with a deficit in attention as opposed to changing physical needs nor did they connect the sleepiness of students with their interest in the classes. Sensory declines in hearing and the accompanying concerns with message comprehension (Wingfield, 1999, 2000) did figure in the respondents' comments, as five of the respondents remarked specifically on the accommodations they had to make to the apparent hearing losses of their students. These accommodations included speaking louder, speaking more slowly and using clear visual aids. However, none of these five respondents made any assumptions about cognitive functioning based on their observation that hearing loss was fairly general among their older students. Memory decline, which is also a well-documented decrement that comes with age (Ashcraft, 1998; Craik, 2000; Hultsch, Hertzog, Dixon, & Small, 1998; and Park, 1998, 1999), was not a topic present in the data supplied by these respondents. The finding of the Seattle Longitudinal Study (Dixon, 1999a; Schaie, 1990, 1994, 1996; and Schaie & Willis, 1986), which found that there is no uniform pattern of age-related changes across all intellectual abilities, did correspond to the respondent data in this study.

As a final point about reactions within teaching, Cathy comments on how the differences between age groups of students informs her teaching practice and shapes her own development:

> I think that's [having many interests] a reflection of how I've become very broad. I think this broadness has come out of the teaching with the seniors. I think they've made me really think about what I teach. They're not interested in knowing the dates of particular activities; what they want to know is the why. I've become certainly more "why"

oriented and more interested in topics if I look at the interpretation.

And so, I know that that's a change in my teaching style[C 335 - 341]

Most of the respondents felt there was some difference in their teaching depending on the respect they held for student cognition.

Preferences

This property of reactions is the partiality to one group of students rather than another. The dimensional range of this property extends from expressions of aversion to expressions of enjoyment. The general consensus of the group was the expression of enjoyment of classes with senior learners. Barbara expresses this view:

> I find it so much more exciting and rewarding teaching seniors because they bring so much experience to it, they have so much to say, so much value to add to the discussion. They are present. They are there because they want to be, and they are so fully present. They are very excited about learning new things, and they share that excitement. [B 143 – 147]

Other respondents tied their statements about preferences to the differences in student motivation, such as in Gordon's comment below:

> But I think that kind of a gap – I find with younger and older students – I always found I like night classes better than I like day classes because I invariably get people who just took the course because they were interested in it and not because they had to fulfill a social sciences requirement or they're an anthropology major and they have to take it anyway [G 429 – 433]

Ian's remarks sum up the general content of this property:

> It's a lot of fun. In fact, I like teaching them [older students] more than I like teaching the young, for the reasons I've said. The young are prettier and handsomer, but that's about it. [Laughter] [I 354 – 356]

The faculty respondents in Bishop-Clark and Lynch's (1995) study expressed a similar preference for older students (p. 753).

Reactions manifested their effect through teacher disposition, practices and preferences in much the same way for all respondents, so a small sampling of quotations captures the variation within this category.

Views

The fourth category is expressed opinions. The category of views includes those views characteristic of cognitive change and aging, and the teacher's role.

Cognitive Change and Aging

This property of views is opinions directly commenting on cognitive development over time. This property is described by a dimensional range that extends from statements about loss to statements about gain and also by a second dimensional range that extends from comments about individual characteristics to shared traits. Respondents had an almost unanimously optimistic perception of adult cognitive development, and when asked how they imagined the life course to progress in terms of typical cognitive development, six believed that people might begin to be less able around the age of 75 or 80. This is approximately the age Schaie (1994, 1996) identifies as the point in the lifespan when cognitive losses become more general in

the overall population. An example of a statement that illustrates this awareness of when losses can be expected is found in Jake's remarks:

> So most of the people that I know are under retirement age and I think that if people do start to sort of "lose it" so to speak umm it's often when they're really quite old. And most of the people that I know that are in the 60s, 70s range don't seem, I mean there are exceptions like I have an uncle with Alzheimer's and it's obvious that he has some kind of mental difficulties. He has trouble remembering things and gets confused and frustrated. But that's an exceptional situation. For the most part, for those people who aren't afflicted by such a thing, they seem to be all there. [J 234 – 240]

Karen is alone among the respondents in anticipating severe losses when eventual declines do occur:

> I find between forty and sixty, there's a real need to converse, and to get into deep thought and really understand the issues. Wanting to understand other people's points and view and wanting to share the issues and ideas. And so it's like, like we're sponges, but in a different way not in an academic way but in making connections with other people enough to really understand where they come from. But then that switch happens and it's like "Whoa, what happened to everybody else's point of view?" [K 396 – 404]

Karen's view that older adults, around the age of 60, lose interest in other people's viewpoints has a connection to the literature. While people do revert

to earlier stages or access earlier ways of thinking when they are needed, healthy adults do not return to a stage which from Karen's description seems very like Piaget's concrete operational stage in children. However, egocentrism in older adults has been explained in the context of autobiographical memory. To express a complex body of literature in simple terms, I rely on Fitzgerald's (1999) evaluation of this body of literature. Older adults have as much information to encode on a daily basis as do younger adults, and the evidence suggests this encoding is accomplished more or less as efficiently as in younger adults. The difference is the content of this daily encoding is highly routinized and may become dull as we age. "This would seem to have important implications for their [older adults] ability to sustain social interactions, to be interesting conversation partners, and to maintain a sense of connectedness with their social world" (Fitzgerald, 1999, p. 167). In this one aspect of autobiographical memory function, older adults have the same capacity but are no longer as engaged by the events of their life or the people in it as they may once have been.

Ian describes a view that indicates stability in adult cognitive development if we take steps to maintain a given level as we age:

> Well, I think that we are all, basically, rational and that we all, basically, have our better nature, but that we all, basically, have a darker nature too. And, I really think that the young, who through good parents, friends, teachers, have a good prospect ahead of them of continuing to apply that rationality to elevate the good side, diminish

> the bad. So that, in life, I think that learning does have a continuing effect of promoting people's happiness and justice. I now think – I'm 71- I now think of things I did when I was in my 30s. It seems like another person; I just cannot even begin to understand what possessed me to do thus and so. I think that we do proceed that way; I think so. Such that the prospect of life from these early beginnings to the end is a good prospect, indeed. On the other hand, I think that people, who don't take up this prospect, get no better. No better at all. And, if I were to put it the way my wife puts it I'd say: the old get older, they don't get better. [I 389 – 401]

Thus, maintenance and compensation theories of adult cognitive development can also be associated with the opinions and beliefs of the respondents in this study. The interplay between fluid and crystallized intelligence indicates that overall cognitive functioning can remain at a relatively stable level of functioning in spite of changes in the characteristics of cognition (Christensen, Jorm, & Henderson, 1997; Fry, 1992; Salthouse, 1999, 2000; and Sternberg, 1996). The general premise of four of the respondents was that cognition seemed to them to remain more or less stable over the life course, even though they recognized that there were changes within this overall stability. This general premise is very similar to the balance achieved by the interplay of fluid and crystallized abilities (Salthouse, 1991, 1996). In regard to plasticity, the untapped reserve of cognitive ability within individuals that can be accessed when needed (Baltes & Baltes, 1990; Fry, 1992; Rybash, Roodin, & Hoyer, 1995), there is some indication in the data that the respondents believed in such a reserve. Seven of

the respondents made multiple comments indicating confidence that an engaged lifestyle would lead to a bright cognitive future. Two of these seven suggested that involvement not only sustained cognitive abilities but also reactivated disused abilities. This is similar to the view of taken by Baltes and Baltes (1990). However, none of the respondents made reference to the possibility of reversing losses in cognitive abilities as does Schaie (1996), for example.

Barbara expresses a gains oriented view of cognition over the lifespan:

> I see it as just broadening and broadening and broadening. As becoming much less black and white, I guess. More ambiguous, more contradictions, more realizing things aren't just this way, they're also this; they might be both at once. Just more realization. And more open to hearing other people. I would really say that more open to other points of view. And yet, really strongly held convictions too. [B 422 – 427]

The possibility of gains in adult cognitive development had some correspondence to the respondents' remarks; however, there is great overlap between the theories of postformal thought and wisdom, and the multiple cognitive-structural theories I have identified with student development in higher education. In regard to postformal thought, the extension of Piagetian theory to a stage of thought in which necessary subjectivity and the ordering of formal operations allows the thinker to fully comprehend the implications of relativism in any situation and yet act within that situation (Dixon, 1999a; and Sinnott, 1996, 1999), there is a tenuous connection between this specific theory and the respondents' comments. Eight of the

respondents opined that older adults were more tolerant of ambiguity than younger adults, and they also noted that mature and older students were more willing to tolerate alternate viewpoints. Respondents also commented on the ability of older students to reach a judgement on issues and to defend these judgements with reasons they had worked out for themselves. These abilities are similar to necessary subjectivity and the ordering of formal operations described in postformal operation theory, but they could also be associated with any development theory that values relativism and commitment to one's judgements such as is found in Perry's Theory of Intellectual and Ethical Development (1968/1999) or in Baxter Magolda's Model of Epistemological Reflection (1998). The concepts associated with wisdom are so multiple (Dixon, 2000; Merriam & Caffarella, 1991; Smith & Tiberius, 1999; Sternberg, 2000; Tennant & Pogson, 1995), that it would be difficult to assess a specific connection between the respondents' beliefs about adult cognitive development and the theories associated with wisdom. However, when they were asked how they imagined adult cognitive development to progress over the lifespan, none of the respondents mentioned the specific term, "wisdom".

Adam's view describes the possibility of gains as describing some individuals but not others:

> Well, I think the potential is great. The realization is another factor. Because, we are, as I said earlier, we are exposed to so much. I have cable T.V., my heavens. I was watching a dear friend of mine, also a New Democrat, Anton Kuerti, the pianist, on a program last night. Well, he and I get together and our wives, and have supper and so forth.

> There's one example, but I can turn on Discovery Channel and catch up on natural science and biological science. Then turn on another channel and get BBC. So there is more input there than more people can naturally digest. What I question among most people, I don't mean to sound like an elitist, is that I don't think that most people want to absorb it let alone think about a lot of this stuff [A 203 - 212]

Gordon also links his comments to the high inter-individual variability that is present in a description of cognitive development:

> I'd have to pin it down with individuals. Because I think it is just so varied. I've seen people and I've had them in some of these seniors classes who might not have changed much in their thinking since gosh knows when. And, others who, you know, it's great seeing someone in there 65 or 70 years old, eyes lighting up, getting all enthused, after class wanting to talk about this and saying, "You know, I hadn't thought about this." Great, and then somebody comes up and tells me about their personal prejudice. I've – I'm not sure about a general pattern. As I say, it's so individually varied. I find it difficult to generalize. No hesitation in generalizing as an anthropologist about people in a particular community, but it's about as far as I want to go on generalizing intellectual development. I've never really thought of it in that sense- differences in age, just differences in students. [G 540 – 551]

Gordon's comment reminds us of one of the central tenets of cognitive development research that we become more individual as we age (Hess & Blanchard-Fields, 1996, p. 359).

The Teacher's Role

This property of views is opinions about the role teachers have in influencing cognitive development. The dimensional range that describes this property extends from a peripheral role to a central role.

The respondents saw themselves as having a more central role with younger students. For example, Cathy says:

> I think especially with the younger kids, you're – I wouldn't say you're influencing them completely, but you are, you are putting a certain slant on what you say. They will take the content because of the marks, but they will also take your style. And I think you need to really reflect on them as a teacher. [C 398 – 401]

Fiona expresses her views about the role of the teacher in influencing the thinking of others like this:

> I have always had great difficulties in feeling like I'm supposed to be some kind of an authority or some kind of expert on a topic. To have all those people looking up at you [expecting you] to deliver them the word. I mean, that's not what supposed to be going on, in my view anyway. You can deliver a few words and try to set off a few sparks and provide a few clues and provide a few directions and some work, but I don't see delivering the final, last word. I think the whole point

of teaching is to encourage people to be very suspicious of final words, at all. [F 456 – 463]

Like many others, Harold sees the obligation of teachers to their students to be unchanged by the age of those students:

> Now I would say my expectations are that XXXX [program for seniors] courses will be more fun for me. That's – well, I mean, generally what you just try to do I guess is help them think about something they haven't thought about or teach them something they don't know, and that doesn't change, I don't think, from age group to age group. [H 231 – 234]

Ian's statements capture the idea of teacher as co-learner:

> And so little by little I came to be quite straightforward with the students by way of saying that – which was true – that many of them were a lot brighter than I was. And that this was an enterprise that we as searching adults were going to enter into, and I've always taken that view. The longer I've taught, the more I've taken the view. [I 375 – 379]

The respondents in this study had a respect for all their students and did not see themselves, as teachers, to be determining the learning of their students, but they did see themselves as having some influence on the learning experiences of their students.

The great diversity of respondent comments analyzed through open coding produced the categories of stimulus, clues, and reactions and views each with a rich

group of properties and dimensional ranges. Each of these categories can also yield information about the social process embedded in the research question when axial coding suggests the underlying social process. This social process is described in the following chapter.

Chapter Five: Findings from Axial Coding
The Underlying Social Process

This chapter views the findings of the study through a second lens, the analysis of axial coding. The data within the four categories (phenomenon) identified in open coding remain the same, but the data are now regarded in light of what they can tell about process. This chapter sets out the process of stimulus, clues, reactions, and views.

The Underlying Social Process

Subjecting the data to the analysis of axial coding highlights the social process that underlies the beliefs of instructors about adult cognitive development. To move from open coding to axial coding involves a shift in interpretive analysis. In open coding the primary concern was with conceptualization; in axial coding the data within each category remains constant but they are examined with regard to their indication of a process. Each category is considered with regard to its causal conditions, context, action/interaction strategies, intervening conditions, and consequences. Illustrative respondent comments are not included in this chapter in order to focus on the procedural features discerned in the data.

Stimulus

The category of stimulus encompasses events or happenings that are identified by participants as affecting cognitive change. These events or happenings arouse cognitive development and can be broken down into the properties of challenges which range from those that are static to those that are increasing, inspiration which range from those that are in the past to those that are in the present, and supports

which range from those that discourage cognitive change to those that encourage cognitive change.

Causal Conditions

The conditions preceding stimulus indicated by the data are contact with people, in particular with those people the participants knew well or with whom they interacted frequently (family, friends, spouses, students). Ideas, such as those expressed by the great philosophers, social forces, such as the job market, and interactions with cultures such as when people travel are other causal conditions present for this category.

Context

Stimulus occurs in the context of post-secondary education with respondents acting in the roles of teacher, learner, or participant in the organizational structure. Family life, friendships, school life, particularly in youth and the milieu of recreation, hobbies, and pastimes were other contexts in which the category of stimulus can be situated.

Strategies

The strategies through which respondents encountered the category of stimulus were seeking out challenges, engaging in discourse, reflecting on their life experiences and the life experiences of others, and seeking out environments (contexts) in which cognitive growth is supported.

Intervening Conditions

The intervening conditions arising from the data that can disrupt stimulus are infirmities that occur as we age, stress and the perception that people lack the time to seek out stimulus, the pressure of work requirements, in particular the vagaries of the

academic job market and mandatory retirement policies for faculty, and societal expectations of older persons.

Consequences

The consequences of the phenomenon of stimulus are the perception that cognitive growth can be cultivated deliberately by an individual, and the perception that personal cognition is growing or, at least, is not regressing.

Clues

The category of clues encompasses those factors that illuminate an individual's understanding of the cognitive changes that occur in others and in one's self; these suggest how others think. The category of clues is depicted by the properties of observations that range from those that are sensory to those that are intuitive, comparisons that range from noting differences to noting similarities, and self-reflections that range from those that are surface to those that are critical.

Causal Condition

The causal conditions present in the data that are the antecedents for clues are an attention to ideas, social processes, and the behaviour of one's self and others, with an exposure to different age groups of people as a key factor.

Context

The context in which respondents discern clues are, once again in similarity to stimulus, the post secondary environment, family, friendships, school life, and recreation, hobbies and pastimes. But unlike the phenomenon of stimulus, the phenomenon of clues also is set in the context of non-teaching work experiences.

Strategies

The strategies in evidence within the data set of the phenomenon, clues, are questioning, evaluating, referencing cognitive models, referencing prototypes, and interaction with others especially in the contexts of teaching, learning, and discoursing.

Intervening Conditions

Conditions that intervene in the discernment of clues are inattention, disinterest in others, lassitude, and isolated cases of over reliance on stereotypes. These conditions can be extracted from respondents' comments about other people and seem to be used by respondents to explain why some (other) people seem oblivious to the possibility of cognitive change.

Consequences

The consequence of discerning the phenomenon clues is that it reveals the cognitive potential of the self and others.

Reactions

The category of reactions is conduct within teaching. This category is represented by the properties of dispositions which range from those that are pessimistic to those that are optimistic, practices which range from those that are responsive to those that are unresponsive, and preferences which range from those that express aversion to those that express enjoyment.

Causal Conditions

The causal conditions are the personal values, individual assumptions and ideas about adult cognitive development that lead to the phenomenon of reactions.

Context

The context for reactions is teaching within post-secondary educational environments with classroom experience being the foremost contextual descriptor.

Strategies

There are many strategies that are performed by respondents within the phenomenon of reactions. There is the conscious effort to act on one's beliefs in ways that are both planned and spontaneous. There is an unconscious conveyance of beliefs to others as in the use of stereotyping, ageist vocabulary. It can be discerned from respondents' comments that assessment of other individuals based on a personal understanding of another person's cognitive potential does occur. Learning climates are created, lessons are delivered, tasks and assignments are set. All these are examples of actions within this phenomenon. There are also interactions with groups and individuals and teachers observe the response of others to their teaching.

Intervening Conditions

The intervening conditions that may limit conduct within teaching are the policy, practice and procedures mandated by people other than the teacher. These sources include institutions, departments and governments. Courses taught for credit impose conditions different and more limiting to teacher reactions than teaching non-credit courses. The degree to which students are self-selecting of their participation in education can limit the reactions of teachers. Teaching aptitude is also an intervening condition that limits teacher reactions.

Consequences

The consequence of the phenomenon reactions is that teachers bring their beliefs about cognitive development into their teaching in many ways. A second consequence of this phenomenon is that observation of the effects of their teaching formed beliefs about adult cognitive development.

Views

The category of views is the expressed opinions of participants. This category is expressed by the properties of cognitive change and aging which ranges both from expressions that suggest loss to expressions that suggest gain and by a range that extends from comments that pertain to the individual to comments that pertain to shared experience. A second property is the teacher's role, which ranges from peripheral to central.

Causal Condition

In my judgement, the causal conditions that were in place as antecedents for the phenomenon of views were first, an accumulation of information about various truth scenarios with an associated willingness to make judgements about which truth scenario was most likely and second, declarative knowledge about these judgements.

Context

The phenomenon of views is situated within post-secondary education (as teacher, learner, and general participant), general observations of people, family experiences, and self-assessment.

Strategies

Views seemed to rely on the following actions/interaction strategies: looking for and thinking about incidents of change, choosing what they considered to be true, and reflecting on purpose in teaching.

Intervening Conditions

The conditions that inferred with the phenomenon of views were conflicting information, observations or experiences; and unwillingness to make judgements based on one's own perceptions.

Consequences

The consequences of the phenomenon are a belief in the malleability of cognition, a belief that teachers can support the cognition of their students, and a belief that one's own cognition can be deliberately enhanced.

When the four categories revealed through open coding are reconfigured to identify causal conditions, context, strategies, intervening conditions, and consequences, the common thread of interaction with other people as a way of forming beliefs, stimulating one's own cognition, and acting in the role of teacher are highlighted. The emerging importance of social interaction led me to examine the ideas associated with social cognition. Social cognition research not only provides additional perspectives about how thinking changes over the lifespan but also explores how social interactions form people's belief systems. The results of axial coding suggested to me that it would be worthwhile to examine how social relationships fashioned the beliefs of the respondents.

Social cognition is concerned with the sociocultural context of development. Of particular interest to me is social cognition literature's concern for "the content of representations of self, other, or social situations [which] should, in principle, be heavily influenced by period-specific and cultural –specific values, beliefs and events" (Blanchard-Fields, 1996, p. 455). These theories of cognitive development do not focus on changes in the mechanisms governing cognition or even on whether individuals are experiencing loss, stability, or gains in overall cognition, but rather they focus on how situational demands alter cognition. This body of literature can be linked to the social process the respondents experienced that shaped their beliefs and it can be linked to the respondents observations of themselves and others (present in the open coding findings) that circumstances sometimes dictated a person's potential for cognitive change.

In seeming similarity to those theories of cognitive development that place an emphasis on relativistic thought in higher level cognition (Baxter Magolda, 1998; Kitchener & King, 1994; Perry, 1968/1999; Sinnott, 1998; and Sternberg, 1996, for example), social cognition focuses on how the everyday thinker is aware that the truth of a solution is dependent on sometimes contradictory information supplied by others' meaning perspectives (Blanchard-Fields, 1996, p. 458). This information is often made up of dispositional information, such as the personality characteristics of oneself and others, and situational characteristics concerning the presence of extenuating circumstances (Blanchard-Fields, 1999, p. 219). However, social cognition attributions differ from postformal thought and other related theories with their reliance on relativism and dialectical thought in that, as Blanchard-Field's (1999)

study suggests, older adults tend to display a dispositional bias. Older women in particular were found to be predisposed to develop beliefs based on their understandings of relationships. Here is further evidence of the overlap and interplay of theories about cognitive development since Belenky, Clinchy, Goldberger, and Tarule's Women's Ways of Knowing and Gilligan's Theory of Women's Moral Development also are concerned with the importance of relationships in informing how people develop meaning (Evans, Forney, & Guido-DiBrito, 1998). Blanchard-Fields (1999) concludes that more research is needed to determine the degree to which the context specificity of social situations determines social cognition. For the purposes of this study, it is useful to note Blanchard-Fields (1999) concedes the possibility that our cognitive processing resources may be vulnerable to being co-opted by our pre-existing beliefs and values (p. 235). This last point seems to me to be an affirmation of the importance of studying the conditions and consequences attached to beliefs within the social context of teaching.

Chapter Six: Findings from Selective Coding
The Overarching Narrative

This chapter presents the overarching narrative produced by selective coding, the conditional matrix's diagrammatic depiction of conditions and consequences flowing from instructor beliefs about adult cognitive development, responses to the research questions, and the implications of this study.

The Overarching Narrative

The task for the analyst in selective coding is to identify one core category in the data and then to use this core category to tell a conceptual story that sums up the findings of the study. The identification of this core category is derived from my holistic understanding of the data in this study and a consideration of the categories revealed through open and axial coding. As Dey (1990) points out, the identification of the core category is the point at which the researcher's judgement and role as the primary tool of data analysis is most evident in the findings produced by a study. In this study, the core category is instructors' belief in malleable cognition. The presentation of the overarching narrative begins with a defence of the core category as a canopy for all the findings and stages of analysis.

Early in the process of selective coding, I thought of the core category by the unwieldy term, "attitude that cognition is within personal governance", but a continued review of the literature introduced me to the term, "malleable" in a study by Berg and Sternberg (1992). The authors focus on conceptions of outstanding intelligence across the lifespan by asking 140 adults of various ages to a list of behaviours characteristic of exceptionally intelligent people on the basis of how likely

it would be for adults aged 30, 50 or 70 years of age to be engaged in such behaviour. One of the results of Berg and Sternberg's study is the assertion that participants believe intelligence to be malleable across the lifespan. This study has a gains oriented focus on cognition, and the authors stress, "the vast majority of adults believed that intelligence is modifiable throughout the lifespan, both in terms of increases and decreases" (p. 228). The respondents in my study had a similar regard for the modifiable nature of cognition, and the term belief in "malleable" cognition was adopted to describe the core category.

As mentioned in chapter three, to be effective "a core category must be central, stable, complex, integrative, incisive, powerful, and highly variable" (Dey, 1999, p. 111). I believe the core category of a belief in malleable cognition is central to the other categories identified through open coding, stimulus, clues, reactions, and views, since respondent comments in all these categories show an underlying belief that cognition is dynamic and open to manipulation. The core category is stable since its description remains constant throughout the overarching narrative. The core category is complex because it has been extended to its several constitutive parts: causal conditions, properties, context, strategies, intervening conditions, and consequences. A belief in malleable cognition is integrative because it has the power to unite the overall analysis into a single storyline, and further, I judge the core category to be incisive because the term "malleable cognition" is sharp and clear enough to convey immediate meaning. The core category is highly variable since it is adaptable to explaining both the conditions that form teacher beliefs and the consequences that flow from those beliefs.

I propose that the core category of belief in a malleable cognition has the attributes of being accessible, purposeful, enhancing, and constructive. The belief in a malleable cognition is accessible in that respondents expressed a general confidence in the ability of people (relatives, friends, students, themselves) to shape their own thinking. This accessibility ranges from arduous tasks such as experiencing transforming life events to easier accessibility such as undertaking a cognitively challenging pastime. The belief in a malleable cognition is purposeful in those respondents who articulated an intention to secure a positive cognitive future for themselves or who had observed this intention in others. Purposefulness ranged from those who had a highly focussed plan to those who had a vague notion of their intentions. The belief in malleable cognition is enhancing since reflection on the subject of cognitive development and one's cognitive future is in itself a source of stimulus through cognitive challenge. This enhancement was slight for some who responded to the questions in this study, but for others, who apparently spent many hours reflecting on their answers, the enhancement may have been more profound. The belief in malleable cognition is constructive in that, ranging from a little to a greater degree, these teacher respondents build their beliefs about cognition, at least in part, *from* their teaching and build their beliefs about cognition *into* their teaching.

The context for the core category, belief in malleable cognition, is simply life in all the many ways the 11 respondents of this study experienced it, but particularly life as experienced in classrooms where the respondents paid particular attention to the thinking of others and the products of that thinking.

I do not suggest that these respondents have consciously undertaken actions that would result in a belief in malleable cognition, but I do propose that the following actions and interactions are directed at carrying out this belief. These strategies are teaching, seeking out challenges to one's own cognition, engagement with other people (especially through discourse), witnessing the cognitive abilities of others over time, and reflecting on one's own cognition.

The conditions that might constrain a belief in malleable cognition are first, witnessing or experiencing cognitive loss. Alzheimer's disease, memory loss, slowed processing skills, and hearing loss are not adaptable and most are not within the direct control of those who experience them. Second, the frustration of teaching students (mostly young students in this data) who do not seem to advance in their thinking is a constraint to belief in malleable cognition.

I suggest that the consequences of belief in a malleable cognition for these teacher respondents were empowerment in regard to their own cognitive future, their many actions and interactions with other people in the classroom and in life, and a general optimism about teaching efficacy and the learner's potential across the lifespan.

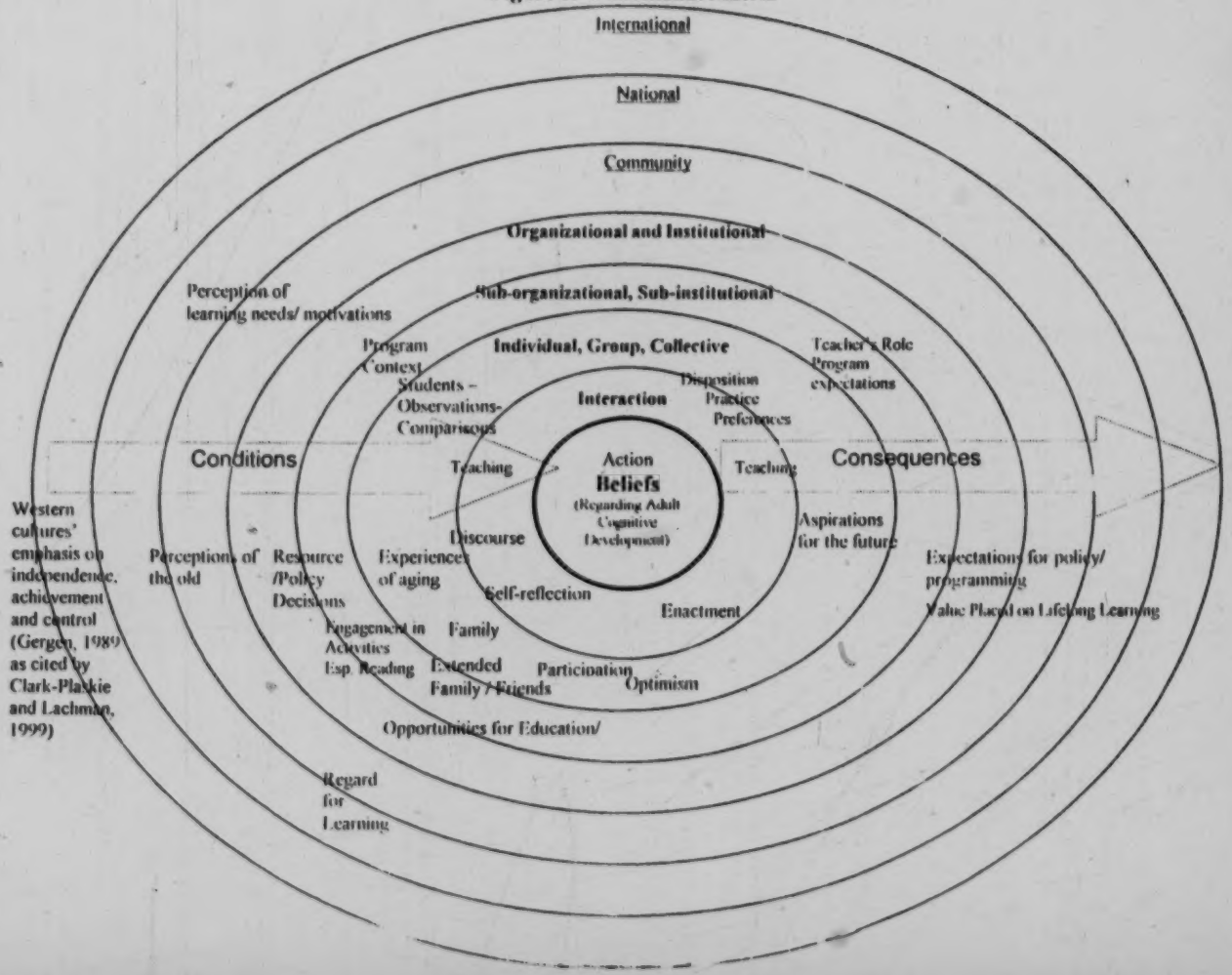
The Conditional Matrix

The conditional matrix is the final product of the grounded theory data analysis, which allows the researcher to both distinguish between and link the levels of conditions and consequences (Strauss & Corbin, 1990). The conditional matrix (Figure 1) is a diagrammatic aid meant to capture the simultaneity of the conditions and consequences relating to teacher beliefs about adult cognitive development in a way that the flow of narrative cannot portray.

The factors in the inner rings are those conditions and consequences most directly related to the action. The principal action is identified in the conditional matrix as belief, so it is important to note that the term "action" in grounded theory can denote physical action, states of being and occurrences. Similar to Strauss and Corbin's identification of "awareness" as an action (Strauss & Corbin, 1998, p. 158), the action of belief identified in this study relates to a state of being rather than a physical manifestation of action. The conditional paths, in the conditional matrix produced by this study, cluster around the levels most directly related to contact between people. Teaching is both a condition that informs instructor beliefs about adult cognitive development and a consequence of beliefs held by the teacher. Observations and comparisons of students, and the stimulus to cognition through the challenge of teaching, the program contexts in which teachers' work, and the perceptions the organization holds regarding the learning needs of mature and older students and faculty all are conditions for the formation of beliefs. A teacher's disposition, practice in the classroom, preferences for some types of students over other types of students, the teacher's perception of his or her role, and the organization's expectations of their teachers and the program offerings are all consequences that flow from the beliefs educators hold about adult cognitive development. In regard to their life outside of teaching, discourse and self-reflection are important conditions for belief. Family, extended family and friends are a very direct influence on beliefs, but behind these influences are the opportunities for learning that these people have experienced, and the regard for learning across the lifespan in their community and their culture. The personal experience of aging that informs beliefs is founded on resources and policy

decisions that shape our workplaces and our education and these in turn are founded on a cultural perception of the old. I have taken the liberty of connecting the general presence of cultural attitudes in the data to the position presented in recent literature that since Western culture values independence, achievement and control, these are the values we use to judge who among us has aged most successfully (Gergen, 1989 as cited by Clark-Plaskie and Lachman, 1999, p. 196).

Figure 1: Conditional Matrix



Response to Research Questions

The main research question states, " What is the relationship between teaching and higher education instructors' beliefs about adult cognitive development?" This question is addressed through an exploration of the following three sub questions:

1. What are the influences that inform educators' conceptions of adult cognitive development?

   The influences that inform educator's conceptions of adult cognitive development are most closely related to educators' experience of other people in the lives of the respondents. Family, spouses, friends, and other social relationships figure prominently in the development of the respondents' beliefs. Respondents were challenged, inspired, and supported by these people. These relationships led to discourse, self-reflection, varying levels of personal engagement, and had an impact on the respondents' own experience of aging. Respondents were also influenced by the wider society, of which they are a part; the cultural perceptions of the old and society's regard for the potential of mature and older people. The institutions and organizations within which the respondents live and work were likely to reflect these cultural and societal attitudes towards the cognitive development of mature and older people.

2. How are these influences related to teaching?

   The relationship between students and teachers was an important one for these respondents. The respondents' observations, comparisons, and self-reflection about students informed their beliefs. They found opportunities for discourse,

cognitive challenge, and support within the educational environment, and though some felt their personal cognitive development to be constrained by the policies of the institution in which they taught, most found teaching situated in the environment of post-secondary education to be a source of important insight into beliefs about adult cognitive development.

3. What is the impact of educator conceptions of adult cognitive development on teaching?

   Beliefs about adult cognitive development are a diversity issue, and like any other diversity issue, these beliefs have importance because teachers are influential people who consciously or unconsciously bring their beliefs into their interactions in the classroom. From the self-reports of the respondents in this study, the impact of a general belief in malleable cognition was that teaching practice, teacher preferences, and teacher disposition were all affected. The teaching of these respondents was shaped by the respondents' optimism about the potential of human thought across the lifespan and their confidence that, at least some of the time, teachers could assist people in realizing that potential.

The research question under investigation in this thesis is:

> What is the relationship between teaching and higher education instructors' beliefs about adult cognitive development?

The relationship between teaching and higher education instructor's beliefs about cognitive development is symbiotic. Teaching, among other factors in the social

and educational environment, shapes instructors' beliefs, and concurrently, instructors' beliefs shape their teaching.

Implications of the Research

I suggest this study implies a need for instructors and others to examine the beliefs they hold about the cognitive potential of people across the lifespan. These attitudes shape the educational environment experienced by the growing number of mature and older students in post-secondary education, and the need to understand this group of students will grow as their presence in post-secondary education increases in the coming decades. The study also implies that a relationship exists between what higher education instructors believe about how thinking changes over the lifespan and their actions within teaching. I further suggest the study implies that educational environments are only one of many factors that influence how teacher develop beliefs about cognitive development, and therefore when we study teacher thinking, we should consider the full range of influences beyond the classroom that shape teacher thinking.

This study offers direction for several areas of future study. Lowyck (1990) suggests two branches of teacher research, description and prescription, have developed due to the prevalence of the short-term view of research on teaching. Lowyck argues greater research effort needs to be concentrated on integrating what teaching "is" and what teaching "ought to be". In regard to research on teacher thinking Lowyck states:

> . . . without a clear statement of the goals to be reached by research on teacher thinking, we can accumulate an enormous host of knowledge.

> Consequently, the amount of knowledge will be negatively correlated with its functionality. Hence, consolidation of research programs is needed as well as the definition of 'stop rules' for both the diversity (i.e. anarchy) and the amount of valuable knowledge (p. 100).

The findings of this exploratory study could have important implications for teaching if they are extended beyond a description of what teachers believe about the cognitive potential and the enactment of these beliefs in their practice. A further step in a research agenda that seeks to move the findings of this study beyond description and into prescription and application would be to gather enough corroborative data to be able to identify how teacher beliefs about cognitive age "ought to" be informed and enacted in teachers' practice and once this extravagantly ambitious goal was accomplished to develop practical strategies for the application of these prescriptive findings. Halpren (1999) suggests cognitive development theories are most useful when teachers introduce these theories to their classes and work with students to incorporate thinking goals into course content. King and Shuford (1996) argue that the Reflective Judgement Model can be used to challenge the cognition of faculty and students on issues related to multiculturalism. I suggest that reference to any of the student cognitive-structural theories discussed in chapter two might challenge faculty and students to consider issues related to diversity based on age and the stereotypes of ageism. Teaching practice research could incorporate King and Shuford's practical suggestions for challenging the thinking of students within post-secondary classrooms with the objective of recognizing age and cognitive diversity. Other studies might build on the observation in this study supported also by Graham (1998) that

educational organizations have the capacity to create a climate supportive of the cognitive development of faculty. It would also be interesting to test the idea of whether and how the predominance of women students in programs aimed at older learners influences the beliefs instructors hold about gender differences related to how people think.

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Appendix A: Sample of Recruitment Letter to Program Heads

Dear _____,

My name is Alison McLaughlin, I am a graduate student in the Adult and Higher Education Program, and I am hoping that you can help me to recruit respondents for my master's thesis research.

My research interest centres on how educators in higher education develop conceptions about the cognitive development of adults. In my current thesis research I will explore the conditions that give rise to awareness of cognitive development and consider the relationship of these conditions to the action of teaching. I will also investigate the consequences of awareness of cognitive development to the professional practice of educators.

To accomplish these goals I will interview experienced teachers currently working in higher education. I am hopeful that you may be able to assist me in finding individuals who have a reputation for being reflective and articulate and who may have an interest in participating in this study.

The time commitment required of the respondents is approximately 140 minutes. 20 minutes to complete a series of questions that will form the basis for discussion in a 90-minute semi-structured interview and 30 minutes to complete a member check. The individual interviews will occur during May and June at a place and time convenient to each respondent.

You can be assured that the ethical guidelines of the University of Alberta will be strictly observed. Confidentially will be honoured, and the respondents may opt out at any time if they wish to do so.

Your assistance in identifying communicative respondents is an important element of my study, and I appreciate your consideration of this matter. I can be reached at alisonm@ualberta.ca or 435-8299. My supervisor, Dr. Carolin Kreber, can be reached at carolin.kreber@ualberta.ca.

Sincerely,

Alison McLaughlin

Appendix B: Sample of Letter to Program Heads Specifying Sampling Criteria

Dear _____,

Thanks very much for agreeing to assist me in the recruitment of participants for my research. As we discussed before, the procedure for finding these participants is to provide you with letters that outline my study and invite participation in the research. Your office will forward the letters to a limited number of instructors from the_____ Program and any of these instructors who wish to participate in the research will contact me directly. As the _____ Program director, you will determine the number of letters sent out and the particular instructors who receive these letters. In this way, your office will be able to keep personnel information confidential, and I will have a communication link with potential candidates for my research. Participation in the study is entirely voluntary, and I would like to confirm that the instructors would freely choose whether or not they would participate in this research.

The criteria for selecting for participants in this study are:

1. The individual instructs a course with an academic focus in the _____ program.
2. The individual is teaching or has taught in an academic setting in which the program is not aimed at a particular age group.
3. The individual has the qualities of a good informant in that they are articulate and reflective.

I appreciate your support in contacting likely candidates.

Yours truly,

Alison McLaughlin

Appendix C: Sample of Recruitment Letter to Potential Respondents

Dear _____;

The _____ program staff has kindly forwarded this letter to you on my behalf. My name is Alison McLaughlin and I am a master's student in the Adult and Higher Education Program of the Educational Policy Studies Department at the University of Alberta. I am looking for respondents for my master's study, and I hope that I can interest you in participating.

My area of interest is in how educators in higher education develop conceptions about the cognitive development of adults. In my thesis research I will explore the conditions that give rise to educators' awareness of cognitive development and consider the relationship of these conditions to the action of teaching. I will also investigate the consequences of awareness of cognitive development to the professional practice of educators. The purpose of this research is to explore and describe the relationship between teaching and educators' perceptions of adult cognitive development.

To accomplish this goal I will interview experienced teachers currently working in higher education who have a reputation for being articulate and reflective educators and who have a range of teaching experience that includes instructing both younger and older adults. The _____ program has forwarded this letter to you because you meet these sampling criteria.

The time commitment required of the respondents is approximately 140 minutes. 20 minutes to complete a series of questions that will form the basis for discussion in a 90-minute interview and 30 minutes to complete a member check. The tape-recorded interview would take place at a time convenient to you during May and June 2000 with possible follow up for clarification, if needed. Respondents will be sent the 20-minute survey prior to the interview in order to allow them to have some time to reflect on the topic before the interview date. Before I use the information from the interview, I will make the transcripts available to you if you would like to review them. An executive summary of the research will be made available to you at the conclusion of my study.

In keeping with the ethical guidelines of the University of Alberta, I will ensure confidentiality by concealing the identity of the respondents, their institution and any individuals who are mentioned by name during the data collection. I will conduct and transcribe the interviews myself and erase the tapes upon completion of the study. Of course, as a participant, you would have the right to opt out of the research at any time for any given reason. Deception will not be used.

Your participation in this study would form a valuable element of my research, and I appreciate your consideration of this matter. If you would be willing to participate in this study, I can be reached at alisonm@ualberta.ca or 435-8299. My supervisor, Dr. Carolin Kreber, can be reached at carolin.kreber@ualberta.ca.

Sincerely,

Alison McLaughlin

Appendix D: Cover Letter for Written Survey

Dear _____,

Thanks once again for agreeing to participate in my study. The intent of my research is to explore the relationship between teacher beliefs about adult cognitive development and teaching. My research is based on the assumption that adult cognition continues to change over a person's lifetime and that the healthy cognitive development of adults is an important element in educational environments, which increasingly include a wide range of differently, aged students. Changes in the way people think over their lifetimes are referred to in this study as "adult cognitive development".

As you read in the recruitment letter, the time commitment I am asking of you is approximately 140 minutes. Attached to this letter you will find a set of questions that will form an initial catalyst for conversation in the interview scheduled for _____. The questions will probably take you no more than 20 minutes to complete. Please bring these pages with you to the interview. Before our interview, I will once again remind you of your right to confidentiality and your right to opt out of the study at any time for any given reason, and I will ask you to sign a consent form. The semi-structured interview will last approximately 90 minutes and will explore the essential questions listed below. Following the interview you will be provided with a transcript and may make corrections or additions that more completely reflect your viewpoint if you so choose.

(The first interview question is based on your responses to the set of written questions attached to this letter.)

1. You've indicated that _____ has importantly or profoundly influenced your understanding of adult cognitive development. Tell me about how you interpret _____ and how it has influenced your conception of adult cognitive development.
2. How has teaching influenced your conception of adult cognitive development?
3. Describe in general terms how you believe adult thinking changes over time.
4. How does this conception, which you've just described, relate to your teaching?
5. What are the consequences of your awareness of adult cognitive development to the way you teach?
6. Do you have anything more to say about the relationship between instructor awareness of cognitive development and teaching?

You will probably find that these questions are difficult to answer, but I have found in the pilot study that by reflecting on the questions attached to this letter and exploring the questions through conversation in a semi-structured interview format that respondents have been able to uncover many interesting insights into the relationship between teaching and teacher beliefs about adult cognitive development.

Please feel free to contact me at 435-8299 or alisonm@ualberta.ca.

Appendix E: Consent Letter

As per the letter dated _____, I, _____, am willing to participate in the study pertaining to higher education instructors' awareness of adult cognitive development, as described by the researcher. I understand that this study is being conducted for the purposes of graduate studies and a thesis regarding the conditions and consequences of higher education instructors' awareness of adult cognitive development and the possible publication of professional articles or conference presentations.

I am aware that I have the right to opt out of this study at any time for any given reason.

I am further aware that the confidentiality of names of respondents, identities of other persons, specific course titles and institutions will be respected throughout the study and its publication and in any subsequent professional articles or conference presentations.

I accept that the letter dated _____ [Reference to Cover Letter for Written Response Form] and the statements in this consent letter represent a full disclosure of the purpose and conditions of this study.

Signature

_____

Date _____

Appendix F: Written Survey

This set of questions is based on the assumption that adult cognition continues to change over a person's lifetime and that each individual has a personal conception of how healthy adult cognition changes as we age. Changes in how people think over their lifetime are referred to in this study as "adult cognitive development".

As you respond to the following items, think of your personal understanding of how healthy adult thinking changes as we age.

Which of the factors listed below have influenced your personal ideas about the changes in thinking that come with maturity?
For each factor listed below, circle the number that best represents the extent of this factor's influence on your ideas of adult cognitive development.

	No influence	Slight Influence	Important Influence	Profound Influence
1. Family	1	2	3	4
2. Friends and associates	1	2	3	4
3. Colleagues	1	2	3	4
4. Your teachers/ instructors/ mentors	1	2	3	4
5. Students	1	2	3	4
6. Academic courses you have taken	1	2	3	4
7. Professional conferences	1	2	3	4
8. Reading	1	2	3	4
9. Electronic Media (television, radio, internet, etc.)	1	2	3	4
10. Cultural Media (theatre, music, dance, film, visual arts, etc.)	1	2	3	4
11. Hobbies and pastimes (travel, sports, games, etc.)	1	2	3	4
12. Teaching	1	2	3	4
13. Non-teaching work experiences	1	2	3	4

14. Are there other factors that have influenced your personal ideas of adult cognitive development?

15. What is your academic background?

16. Describe your teaching experience.
(Including teaching assistantships, sessional, part-time or volunteer experience.)

17. What are you current teaching responsibilities? Please describe typical class sizes, your course load, and your subject area(s).

Thanks for completing these questions; I look forward to exploring your answers in the interview.

Appendix G: Interview Guide

Essential Questions	Possible Extra Questions	Possible Probes
1. In the survey you've indicated that _____ has importantly or profoundly influenced your understanding of adult cognitive development. Tell me about how you interpret _____ and how this influenced your conception of adult cognitive development. → ***Question 1 was posed for each factor on the survey that had been ranked as an important or profound influence.***	Can you recall a specific incident connected with _____ that gave you some insight into how other people develop the way they think? Have you ever observed an apparent shift in the way other people think that might be attributed to change in the way they think? You've indicated that _____ has influenced you. Can you comment on why you have identified this category as shaping your ideas and beliefs about the way adult thinking changes over time?	Probes depend on the influence that is under discussion. E.g. If cultural media were identified as an influence, one might ask: Do you think popular culture portrays the cognitive abilities of older people in an accurate manner? If reading were identified as an influence: Can you identify any particular books that have shaped your beliefs and ideas about the way adult thinking changes over time?
2. How has teaching influenced your perception of adult cognitive development? →	Can you speculate why teaching has not influenced your ideas and beliefs about adult cognitive development? (Unused alternative)	Has interaction with students informed the way you look at changes that come with maturity?
3. Describe, in general terms, how you believe adult thinking changes over time. →	What do imagine happens to people's cognition, as they grow older? Imagine a timeline, what happens to adult thinking between the ages of 18 and 100 years of age?	How would you typify the thinking of someone who is 18? Would a 40 year old think differently than an 18 year old Any changes for someone who is 60 compared to the 18 year old or the 40 year old? . . . An 80 year old? Reflecting on yourself at these ages, do you see any differences?
4. How does this conception, which you've just described, relate to your teaching? →	Do you see a connection between your ideas regarding cognitive development and what happens in your classroom?	Do you think your ideas and beliefs about adult cognitive development are communicated in your teaching? Do your ideas and beliefs regarding adult cognitive development affect the your interactions with students either in individual situations or in the classroom? Does teaching inform your ideas about cognitive developments?
5. What are the consequences of your awareness of adult cognitive development to the way you teach? →	1.Do you think the ideas and beliefs you hold make a difference to the way you teach? 2.What are the consequences of your awareness of adult cognitive development to the way you teach?	What are the consequences to the content you choose to cover? What are the consequences to your expectations of your students? What are the consequences to the teaching strategies you use?

Do you have anything more to say regarding the relationship between instructors' beliefs about adult cognitive development and teaching?

Appendix H: Initial Coding Structure Used for Open Coding Breaking Down, Comparing, and Examining Phase

Family
- -Exemplars (loss, gain, stability in cognition)
- -Supports to participant's cognitive growth
- -Inspired personal cognitive change
- -Communication of attitudes about cognitive development

Other People
- -Exemplars (loss, gain, stability in cognition)
- -Supported participant's cognitive growth
- -Inspired personal cognitive change
- -Communication of attitudes about cognitive development

Human Interactions
- -Discourse with others
  - -Enhances own cognition (challenge)
  - -Reveals how others think
- -Teaching
  - -Enhances own cognition (challenge)
  - -Reveals how others think
  - -As response to students
    - -course content -assumptions/ surprises
    - -enjoyment -expectations

Self
- -Reflection
  - -Self criticism (awareness of cognitive processes)
  - -Story telling
- -Experience of Aging
  - -Observations -Biographical details
- -Observations about limits on deliberate enhancement of cognition
  - -local (stress, concern about mortality, mobility, retirement)
  - -global (job markets, time, T.V., retirement (i.e. mandated))

Students
- -Young Old comparisons
  - -Response/ Participation in discourse -Outlook
  - -Creativity/ Risk Taking -Motivation
  - -Diligence -course focussed
  - -Opinions -learning focussed
  - -Critical stance
  - -Response to complex ideas (patience, tolerance for ambiguity, understanding)
- -Observations about female students
  - -Belief in self
  - -High ratio of females in classes for older adults
  - -Contrasts- older women older men (intellectual curiosity, willingness to engage)
- -Presence of Infirmities
  - -Hearing -Processing
  - -Memory
  - -Overcoming infirmities through will
- -Older Students as Returning to Basics
  - -Simplicity beyond complexity
  - -Assumptions of loss

Non-Human
-Reading
-Reveals how others think
-Enhances own cognitive development (challenge)
-As a teaching tool to challenge other's cognition
-Discipline (i.e. field of study)
-Study reveals how others think
-Enhances own cognitive development (challenge)
-As a teaching tool to challenge other's cognition
-Travel
-Reveals how others think
-Enhances own cognitive development (challenge)
-Hobbies/Activities
-Reveals how others think
-Media
-As teaching tool
-As source of information about cognition (DM -
Enhances own cognitive development (challenge

Comments on cognitive development in relation to time
-Changing nature of own perspective (over time)
-Intra-individual variability
-Primacy of personality/basic traits (over the lifespan)
Hidden Assumptions
-Stereotyping vocabulary
Effect of life stages
-as support to cognition
-as limit on cognition
Definitions of terms (as verbalized by participants)

Appendix I: Open Coding
Conceptualization Phase

Category (**Phenomenon**)	Properties (Attributes or Characteristics)	Dimensional Range (Location of Properties Along a Continuum)
1. **Stimulus** This phenomenon encompass events or happenings that are identified by participants as affecting cognitive change – these arouse cognitive development	Challenges to Cognition *Difficult or demanding tasks or tasks that enhance or provoke thought* Inspiration for growth *Influential people, sudden brilliant ideas – however conveyed, new ideas that grip a person* Supports for change *Help and corroboration* ***or*** *hindrance to cognitive development*	Static ↔Increasing Past ↔ Present Discourages ↔ Encourages
2. **Clues** *This phenomenon includes those factors that illuminate an individuals understanding of the cognition changes occur in others and in one's self.- these suggest how others think*	Observations *Learned by watching, perceived of others, notice taken of something outside the self* Comparisons *Estimates of similarity between groups of differently aged students, both direct and implied comparisons* Self Reflection *Statements based on meditation with oneself about one's own experience.*	Sensory ↔ Intuitive Different ↔ Same Surface ↔ Critical
3. **Reactions** *Conduct within teaching*	Disposition *Personal way of regarding the cognitive nature of others, including expectations and disproved assumptions* Practices *Action in the classroom and other educational environments* Preferences *Partiality to one group of students rather than to another*	Pessimistic ↔ Optimistic Unresponsive ↔ Responsive Aversion ↔ Enjoyment
4. **Views** *Expressed opinions*	Cognitive Change and Aging Teacher's Role	Loss↔ Gain Individual ↔ Shared Peripheral ↔ Central

Appendix J: Reliability Check
Categories – Properties – Dimensional Ranges

Category		Property	Dimensional Range
Stimulus	1.00	Challenges to Cognition	Static ↔ Increasing
r = 94/95 = 0.99	0.97	Inspiration for Growth	Past ↔ Present
	1.00	Supports for Change	Discourages ↔ Encourages
Clues	1.00	Observations	Sensory ↔ Intuitive
r = 96/104 = 0.92	0.87	Comparisons	Different ↔ Same
	1.00	Self Reflection	Surface ↔ Critical
Reactions	0.88	Disposition	Pessimistic ↔ Optimistic
r = 80/84 = 0.95	1.00	Practices	Unresponsive ↔ Responsive
	1.00	Preferences	Aversion ↔ Enjoyment
Views	1.00	Cognitive Change and Aging	Individual ↔ Shared Loss ↔ Gain
r = 40/40 = 1.00	1.00	Teacher's Role	Peripheral ↔ Central

r = # of agreements/ total # of agreements + disagreements
r = 94 + 96 + 80 +40 / 95 + 104 + 84 + 40

r = 310/323 = 0.96

Appendix K: Axial Coding
The Underlying Social Process

Causal Condition → **Stimulus** (Phenomenon)

- Influence of people, most particularly those we know well or with whom we interact
- Influence of ideas, social forces, interactions with other

Properties	Dimensions
• Challenges	Static ↔ Increasing
• Inspiration	Past ↔ Present
• Supports	Discourages ↔ Encourages

Context

- Post-secondary education (teaching, learning, participating)
- Family life
- Friendships
- School life (particularly in youth)
- Recreation/Hobbies/ Pastimes

Strategies

- Seek out challenges
- Engage in discourse
- Reflect on the life experiences of self and others
- Seek out environments, contexts in which cognitive growth is supported

Intervening Conditions

- Infirmities
- Stress, perceived lack of time
- Pressures of work requirements (job markets, retirement policies)
- Social expectations

Consequences

- Perception of personal cognitive growth (change)

Causal Conditions → **Clues** (Phenomenon)

- Attention to ideas, social processes, and behaviour of self and others (especially exposure to different age groups of people)

Properties	Dimensions
• Observations	Sensory ↔ Intuitive
• Comparisons	Different ↔ Same
• Self-reflection	Surface ↔ Critical

Context

- Post-secondary education (teaching, learning, participating)
- Family life
- Friendships
- School life (particularly in youth)
- Recreation/Hobbies/ Pastimes

- Non – teaching work experiences

Strategies
- Questioning
- Evaluating
- Reference to cognitive models
- Reference to prototypes
- Interaction with others (esp. teaching, learning, discourse)

Intervening Conditions
- Inattention, disinterest in others, lassitude, reliance on stereotypes

Consequences
- Revelations of the cognitive potential of self and others

Causal Conditions → **Reactions** (Phenomenon)
- Personal values
- Assumptions
- Ideas about adult cognitive development

Properties
- Disposition
  - Practices
  - Preferences

Dimensions
Pessimistic ↔ Optimistic
Unresponsive ↔ Responsive
Aversion ↔ Enjoyment

Context
- Teaching within post-secondary educational environments (esp. classrooms)

Strategies
- Conscious effort to act on beliefs (planned and spontaneous)
- Unconsciously conveying beliefs to others (esp. through stereotyping vocabulary)
- Assessing others based on personal understanding of their cognitive potential
- Creating learning climates
- Delivering lessons
- Setting assignments/ tasks
- Interacting with groups and individuals
- Observing the response of others to teaching

Intervening Conditions
- Policy, practice and procedures mandated by persons other than the teacher (institutions, departments, governments etc.)
- Courses for credit vs. courses that are not graded
- Degree to which students self-select their participation in education
- Teaching aptitude

Consequences
- Bring beliefs about adult cognitive development into teaching
- Form beliefs about adult cognitive development through the action of teaching

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Causal Condition → **Views** (Phenomenon)

- Accumulation of information about various truth scenarios and willingness to make judgements about which truth scenarios are most likely
- Declarative knowledge about these judgements

Properties	Dimensions
• Cognitive development over the lifespan	Loss ↔ Gain and Individual ↔ Shared
• Teacher's Role	Peripheral ↔ Central

Context

- Post-secondary education (teaching, learning, participating)
- General observations
- Family experiences
- Self assessment

Strategies

- Looking for/ thinking about incidents of change
- Choosing what we consider to be true
- Reflecting on purpose in teaching

Intervening Conditions

- Conflicting information, observations or experiences
- Unwillingness to make judgements based on own perceptions

Consequences

- Belief in the malleability of cognition
- Belief that teachers can support the cognition of students
- Belief that own cognition can be deliberately enhanced

Appendix L: Selective Coding
The Overarching Narrative

Causal Condition → Belief in Malleable Cognition **(phenomenon)**

- Optimistic view of aging
- Connect wilful endeavours with cognitive gains over the lifespan
- Recognize changes in cognition in the short term and over the lifespan

Properties	Dimensions
• Accessible	Arduously ↔ Easily
• Purposeful	Vague ↔ Focussed
• Enhancing	Slightly ↔ Profoundly
• Constructive	Little ↔ Great

Context

- Life (especially as experienced in classrooms where we witness the products of others thinking)

Strategies (Action/ Interaction)

- Teaching
- Seeking out challenges to one's own cognition
- Engagement with other people (esp. through discourse)
- Witnessing the cognitive abilities of others over time
- Reflecting on changes in one's own cognition

Intervening Conditions

- Witnessing or experiencing cognitive loss (Alzheimer's disease, memory loss, slowing, hearing loss [sometimes interpreted as cognitive loss])
- Frustration of teaching (usually young adult) students who seem not to advance in their thinking

Consequences

- Empowerment in regard to one's own cognitive future
- Action/interaction (in life and in the classroom)
- Optimism about teaching efficacy and learner's potential

Appendix M: Principle Theories from Literature Review Chapter and their Connection to the Data

Theory	References	Connection to Data
Adult Cognitive Development		
Decrements in Cognitive Development		
Terminal Drop	Rybash et al. (1995) Schaie & Willis (1991) White & Cunningham (1988)	No one made any comment about the inevitable declines of aging. There were no comments even remotely associated with decline preceding death.
Slowed Processing	Dixon (2000) Fry (1992) Hess & Blanchard Fields (1996) Park (1999) Rybash et al. (1995) Salthouse (1991, 1996)	Although this is a nearly universal effect, no one made any comment on finding that people slowed down with age.
Sensory Decline	Wingfield (1999, 2000)	Five of the respondents commented specifically on the accommodations they had to make to the apparent hearing losses of their students. These accommodations included speaking louder, more slowly and using clear visual aids.
Attention	Ashcraft (1998) Fry (1992) Rogers (2000) Rybash et al. (1995)	Two of the respondents commented that they had had the experience of older learners falling asleep in their classes, but they did not specifically connect this observation to attention (nor did they connect it to their teaching competence).
Memory	Aschraft (1998) Craik (2000) Hultsch, Hertzog, Dixon, & Small (1998) Park (1998) Park (1999)	None of the respondents made reference to memory as a decrement that could be expected with age.
The Seattle Longitudinal Study	Dixon (1999) Schaie (1990, 1994, 1996) Schaie and Willis (1986)	Respondents had an almost unanimously optimistic perception of adult cognitive development, but when asked how they imaged the life course, six believed that people might begin to be less able around the age of 75 or 80. This is more or less when Schaie says decrements become most profound.

Maintenance or Compensation in Adult Cognitive Development		
Fluid vs. Crystallized Intelligence	Christensen et al. (1997) Fry (1992) Salthouse (1999, 2000) Sternberg (1996)	Three respondents made the comment that their mature students, who had recently returned to education, were very anxious about how they would perform on tests. This may have some connection to fading fluid intelligence levels due to a lack of recent experience with academic learning tasks. This might also be connected to the concept of plasticity. Four respondents had a general theme through their individual comments that thinking probably remained stable if not unchanging through most of adulthood.
Plasticity	Baltes & Baltes (1990) Fry (1992) Rybash et al. (1995)	All of the respondents made comments that indicated a belief in the possibility of maintenance of cognitive abilities over the life course. In regard to themselves, 7 made multiple comments that indicated confidence that an engaged lifestyle would lead to a bright cognitive future. No one made reference to reversing the effects of cognitive loss.
Gains Associated with Adult Cognitive Development		
Postformal Thought	Dixon (1999) Piaget (1965) Sinnott (1996, 1999)	8 of the respondents found that older students were much more tolerant of ambiguity, that mature and older students were more willing to tolerate alternate viewpoints and yet were able to defend their judgements with reasons. This observation could also be connected to any of the cognitive structural theories covered in the student development section especially those such as Perry and Baxter Magolda who recognize relativistic thought as being a higher order stage of thinking.

Wisdom	Dixon (2000) Merriam & Caffarella (1991) Smith & Tiberius (1999) Sternberg (2000) Tennant & Pogson (1995)	No one made specific reference to wisdom, but 7 respondents described individuals they considered to be illustrative of how thinking changes over the lifespan. These examples would fit the characteristics for wisdom (practical intelligence and expertise) described in the literature review. Also, 5 of the respondents discussed how they engaged in hobbies to the level of challenging their expertise (although they did not use this term) as a way of challenging and developing their cognitive potential.
Student Development		
Perry's Theory of Intellectual and Ethical Development	Evans, Forney, & Guido-DiBrito (1998) Perry (1968/1999)	Like the theories of postformal thought and wisdom, Perry's theory represents a gain in cognition and can be linked to potential for growth with age. 7 respondents commented on the appreciation older students seem to have for appreciating the content and complexity of problems, a trait which might be linked to Perry's emphasis on relativism and commitment can be linked to the perception held by some respondents that older students, especially, were firm in their opinions and could back these opinions with justifications. However, whether these observations can best be linked to postformal operations, or Perry theory of intellectual and ethical development or Baxter Magolda's Model of epistemological reflection is beyond the scope to this study.
Belenky, Clinchy, Goldberger, and Tarule's Women's Ways of Knowing	Belenky et al. (1986) Orr & Luszez (1994)	Two of the respondents specifically mentioned that they found the older women in their classes to respond differently to the material than did the men. One found women to be more critical of non-traditional ideas in art, and one commented that women had "a way of knowing very connected to family". I suggest this last comment can be connected to Belenky et al.'s ideas about received and constructed knowledge. Six commented on the fact that women far outnumber men in higher education

		programs aimed at older learners. Greater engagement in organized learning by older women cannot be directly linked to any of the theories discussed in Chapter Two.
Baxter Magolda's Model of Epistemological Reflection	Baxter Magolda (1998) Evans et al. (1998)	See comments related to Perry's Theory of Intellectual and Moral Development.
King and Kitchener's Reflective Judgement Model	Evans et al. (1998) King & Kitchener (1990) King & Kitchener (1994) Kitchener (1986)	The respondents comments on the ability of older adults to defend their opinions and the opinion held by 5 of the respondents that older students were more capable critical thinkers might be linked to the reflective thinking stages of this model.
Kohlberg's Theory of Moral Development	Atkinson (1983) Evans et al. (1998) Kohlberg (1972/ 1973)	As with King and Kitchener's model it is difficult to assess whether a general regard for the judgement making abilities of older people is a validation of one specific theory over another.
Gilligan's Theory of Women's Moral Development	Evans et al. (1998) Gilligan (1995)	Gilligan's theory is concerned with care and connection, and this social process underlying cognitive development did emerge in the data since respondents talked a great length about the people they knew well and how these people had influenced their opinions and stimulated their own cognition. This social connection is explored in a discussion of social cognition as an element of the underlying social process (Chapter 5)
Beliefs About Adult Cognitive Development	Baltes & Baltes (1990) Dixon (2000) Heckhausen & Krueger (1993) Heckhausen, et al. (1989)	These studies support the idea that people, in general, have fairly reasonable ideas about cognitive development that corresponds to what is know in the research. This corresponds to the generally optimistic view of the respondents in this study, and to their recognition that there are great individual differences.
	Hertzog, et al. (1999)	One of the respondents made the comment that it was very necessary to have confidence in your mind even though you are aging. This connects to an explicit belief in one's own abilities.
	Hess & Blanchard Fields (1996) Hummert (1990)	The two "younger" teachers in this study did not connect negative stereotypes with the old in any of their comments.

	Kite & Johnson (1988)	In contrast to Kite and Johnson who found that people held more negative stereotypes about the old than they did about the young; the reverse was present in the data of this study. There were virtually no negative statements about older students, but mature students were considered to be more stressed by exams and more preoccupied with family, while traditionally aged younger students were seen as lazier, less interested in learning, and less responsible for their own learning. I suggest that stereotypes might be connected to attitudes toward younger students.
	Willis & Schaie (1999)	Many of the respondents found that it was their experience with older students that had given them respect for the learning potential of other people. These experienced teachers did not hold the mistaken assumption that cognition peaked in young adulthood. Respondents were nearly uniform in their respect for the abilities of mature and older students.